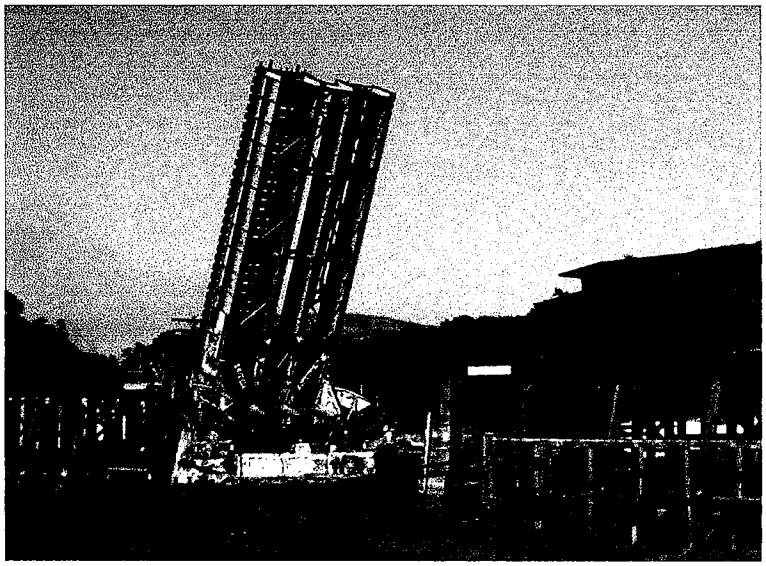
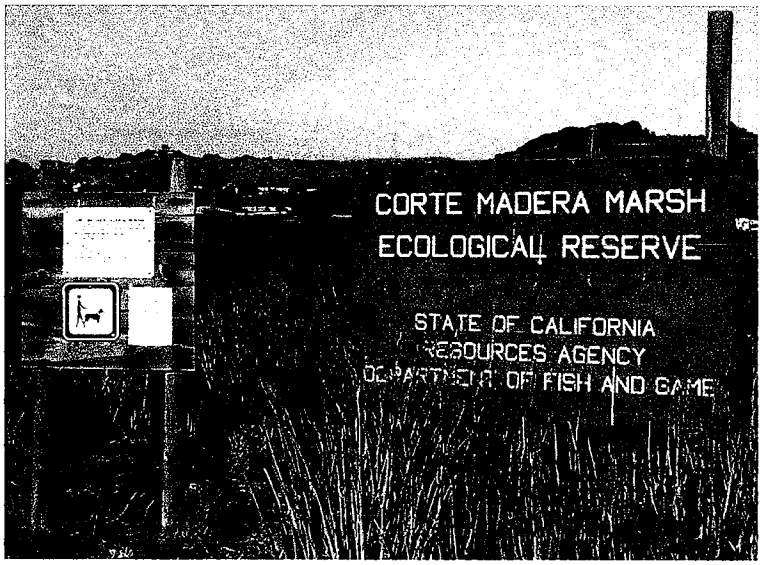
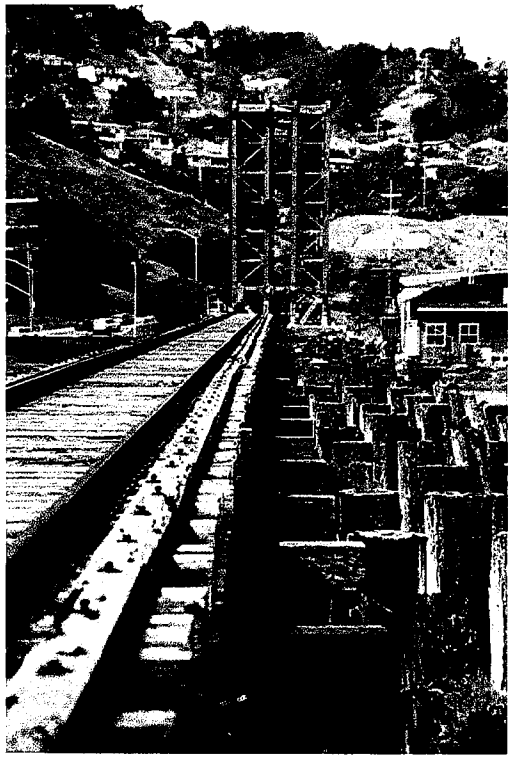
FINAL

CENTRAL MARIN FERRY CONNECTION PROJECT







Prepared For
City of Larkspur

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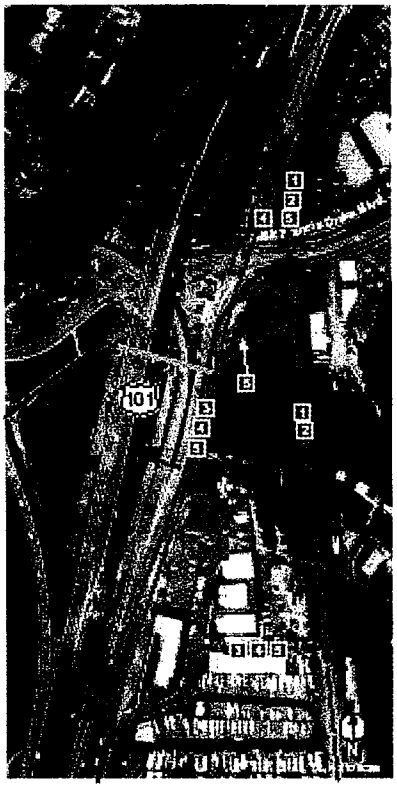
EXECUTIVE SUMMARY

The Central Marin Ferry Connection (CMFC) project was first identified in the Marin County Bicycle and Pedestrian Master Plan (2000) as one of the top 25 most important projects in Marin County for a number of reasons:

1. It is at the crossroads of almost all trips between central and southern Marin County.
2. It serves the Larkspur Ferry Terminal, a major destination and one that is easily accessible by walking or bicycling from many residential areas.
3. The current situation is inadequate to encourage more bicycling and walking within the corridor.
4. It connects numerous school, shopping, recreation, and commuter routes and existing bikeway segments.

This project is located on the east side of U.S. 101 between the East Sir Francis Drake Boulevard (ESFD) corridor on the north and the communities of Larkspur and Corte Madera on the south. This corridor provides access to many important destinations including the Larkspur Landing Shopping Center, Bon Air Shopping Center, Marin Central Plaza, Drakes Landing, Larkspur Ferry Terminal, and the residential communities at Greenbrae Boardwalk, Marin RV Park, Golden Gate Trailer Park, and the apartments at Larkspur Landing. In addition, this project connects to existing trail systems along Corte Madera Creek, the trails along Paradise Drive in Corte Madera, and the trail system in Larkspur and Corte Madera within the abandoned Northwestern Pacific Railroad corridor.



The five options for the CMFC project as illustrated in the 2000 Marin County Bicycle and Pedestrian Master Plan.

Currently, the U.S. 101 Corte Madera Creek overcrossing does provide bicycle and pedestrian access over the creek, but this connection consists of a narrow sidewalk on the east side that places users very close to high-speed traffic and a narrow separated pathway on west side of the highway that requires bicyclists to dismount. The purpose of the Central Marin Ferry Connection Feasibility Study is to determine a more user-friendly alignment.

In early 2002, the City of Larkspur received a Bay Trail Planning Grant to initiate research into this project. Alta Planning + Design was hired to review the five corridor

alignment options mentioned in the Marin County Bicycle and Pedestrian Master Plan, develop and eliminate others as relevant, and to recommend a preferred alignment. This study and accompanying preliminary design documents are the result of that planning grant.

PROJECT ALTERNATIVES

Two major alternatives were developed, each with three sub-options. The primary alignments were defined as either (1) a multi-use path along the NWP right-of-way, or (2) a Class 1 multi-use path along Redwood Highway.

ALTERNATIVE ONE - Locate a multi-use path on the NWP right-of-way starting at Wornum Drive.

Sub-Option 1A - *NWP/Drawbridge*

- The multi-use path follows the NWP right-of-way from Wornum/Redwood Highway northward across a rehabilitated trestle and drawbridge, connecting to the south side of East Sir Francis Drake Boulevard (ESFD) on a new ramp.
- A new drawbridge would be installed at Corte Madera Creek.
- The pathway could continue across ESFD on a new bridge as part of a future connection to Cal Park Tunnel and/or Larkspur Landing.
- The multi-use path would fall entirely within the NWP right-of-way.

Sub-Option 1B - *NWP/Ramped Bridge*

- This option is similar to Sub-Option 1A but rather than using the existing trestle and drawbridge across Corte Madera Creek, the existing trestle and drawbridge would be removed and a new fixed bridge constructed within the NWP right-of-way. The bridge would provide sufficient clearance to meet Coast Guard requirements and utilize the existing concrete abutments.

Sub-Option 1C - *NWP/Off-ramp*

- The multi-use path follows the NWP right-of-way from Wornum/Redwood Highway up to a new east-west easement to be purchased from the property owner. The easement would take the pathway to the frontage road, and connect to the new U.S. 101 bridge and pathway as described below under Alternative 2. This is a hybrid option between Alternatives 1 and 2, taking advantage of the NWP right-of-way while avoiding the problems with the trestle and drawbridge. A new ramp connects the off-ramp path with the existing at-grade SFDB paths.
- On the north side of Corte Madera Creek, the path could cross over ESFD on a new bridge that meets the NWP right-of-way on the north side of the road. Although this crossing is within the scope of the CMFC project, it would most likely be constructed as part of a future connection to the Cal Park Tunnel or Larkspur Landing.

ALTERNATIVE TWO - Locate a Class1 multi-use path along the west side of Redwood Highway from Wornum Drive northward.

Sub-Option 2A - *Redwood Highway/Off-ramp*

- A 10- to 12-foot wide Class 1 multi-use path would be installed along the west side of Redwood Highway from Wornum Drive to the existing pathway location leading onto the Corte Madera Creek U.S. 101 bridge.
- The Class 1 path would lead directly to a new bridge structure on the U.S. 101 ESFD off-ramp bent caps. A new ramp would connect the off-ramp path to the existing at-grade ESFD paths.
- On the north side of Corte Madera Creek, the path could cross over ESFD on a new bridge that meets the NWP right-of-way on the north side of the road. This would likely be constructed as part of a future connection to the Cal Park Tunnel or Larkspur Landing.

Sub-Option 2B - *Redwood Highway/Off-ramp/Trestle*

- This is essentially the same as Sub-Option 2A, except that a new wooden trestle would link to the existing historic trestle rather than constructing a new bridge directly from the new U.S. 101 off-ramp bridge. This elevated structure could be constructed directly over the existing boardwalk in this area. From that point the path could continue over ESFD on a new bridge to be constructed if and when the Cal Park Tunnel project moves forward or a connection to Larkspur Landing is sought.

Sub-Option 2C - *Redwood Highway/Off-ramp/No SFDB Crossing*

- This is essentially the same option as 2A and 2B except that rather than a new bridge over ESFD, users are simply directed along the south side of ESFD to the existing signals and crosswalks at Larkspur Landing Circle.

The ability to construct a project in phases can be an important element because it may allow for agency location of funds over time, rather than all at once. The three phases of all options include the southern section along the NWP right-of-way between Corte Madera Creek and Wornum Drive (Phase 1), crossing Corte Madera Creek to East Sir Francis Drake Boulevard (Phase 2), and crossing East Sir Francis Drake Boulevard to connect to Larkspur Landing and the future Cal Park Tunnel bikeway (Phase 3).

EVALUATION

A decision matrix with clearly described criteria and scoring was used to evaluate each project alternative. The evaluation criteria were based on the overall project goals and were weighted to reflect the relative importance of each category. This criterion was then used to evaluate each of the alternative alignments. The criteria used for the CMFC alternatives was as follows:

- Vehicle Conflicts / User Safety
- Functionality / Access
- Usage
- Cost
- Compatibility with Plans
- Potential Implementation Problems
- Ease of Implementation
- Public Support
- Privacy / Security
- North-South Bikeway
- Right-of-Way
- Environmental / Wetland Impacts
- Cultural Resources
- Noise / Health
- Aesthetics / Visual Impacts

Alternative 1B scored the highest due to the complete separation from motor vehicle traffic, functionality, directness, maximum usage potential, aesthetics, and public support. Alternative 1A also scored well because of the same characteristics as 1B, but implementation complications prevented it from outscoring 1B. Alternatives 2A, 2B, and 2C scored lowest due to the combination of a less-than-desirable environment to walk or bicycle (due to the proximity to U.S. 101), and/or the cost.

The Technical Advisory Committee reviewed and discussed the results of this screening process with the result that three preferred alignments (1A, 1B, and 1C) were identified for more in-depth analysis. Alternative 1A was determined to have several significant problems. This includes inherent problems with operating a drawbridge and the condition of the drawbridge itself. Due to these and other problems, Alternative 1A was dropped from consideration.

Alternatives 1B and 1C more closely meet the goals and objectives of the Technical Advisory Committee (TAC). Alternative 1B scores the highest based on the criteria discussed previously and is a preferred option of the TAC, but there are six major obstacles that need to be overcome:

1. Finding an agency willing to take on the construction, operation, and maintenance of a new high-level bridge
2. Compatibility with future SMART plans
3. Controversy surrounding loss of trestle and drawbridge
4. Environmental impacts to the wetlands during construction
5. Visual impacts from a high level bridge
6. Easement acquisition through the Marin RV Park

Alternative 1C contains many of the advantages of Alternatives 1A and 1B, but is not as direct as either of those options. Safety issues would be minimal since a single traffic conflict would occur at the un-signalized crossing of Redwood Highway on its northern section where low traffic volumes exist. The Class 1 path in the NWP right-of-way and the new bent cap structure could be completed with minimal environmental impact. However, potential fatal flaws for this

alignment include potential conflicts with future Corte Madera Creek U.S. 101 widening, the need for Caltrans approvals, and the need to acquire the easement through the mobile home park.

TAC RECOMMENDATION

After reviewing the materials developed in this feasibility study, the Technical Advisory Committee unanimously recommended the following at their February 4, 2004, meeting:

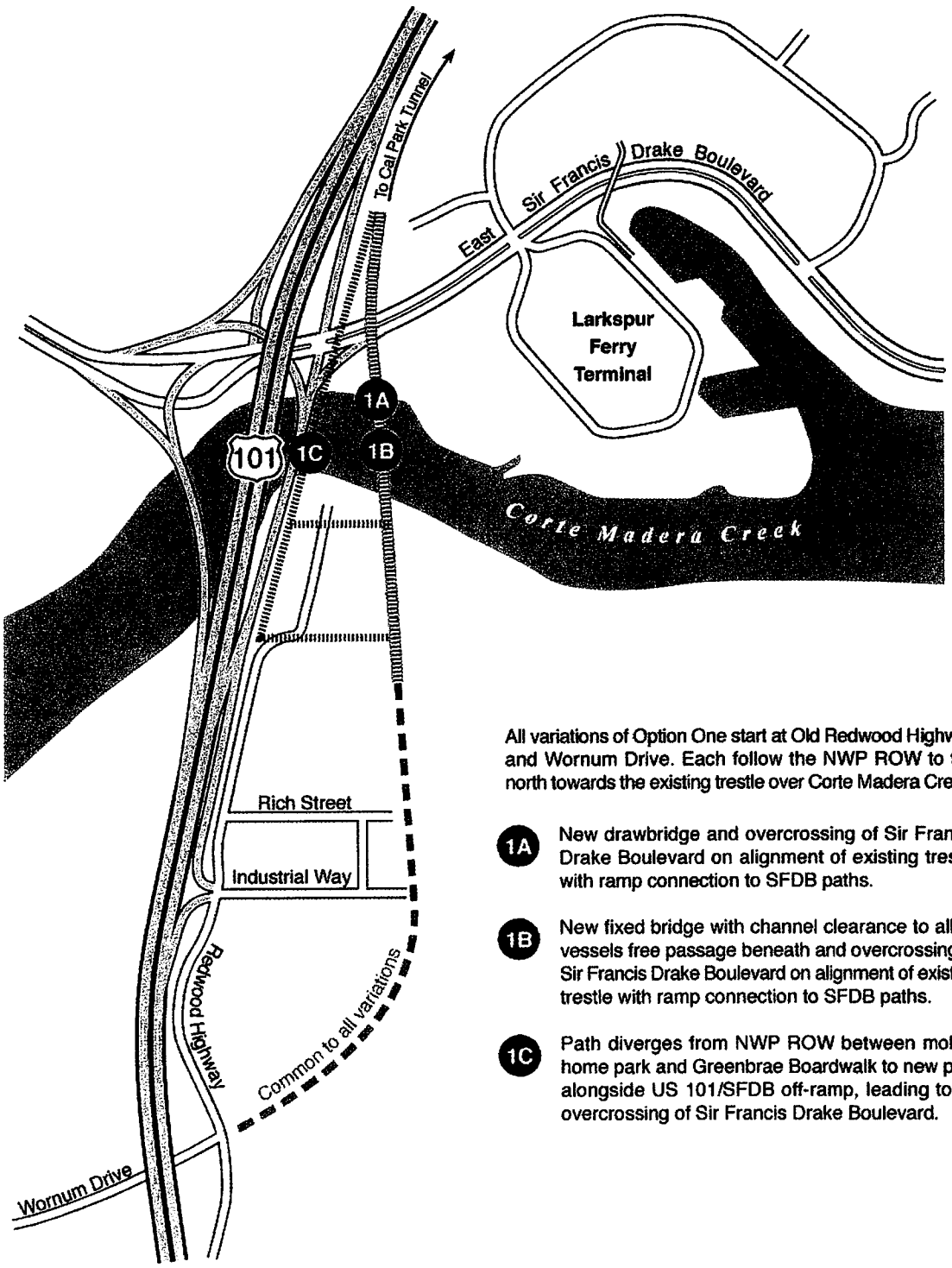
- The preferred alignment for the Central Marin Ferry Connection project is Alternative 1B, which essentially follows the old Northwestern Pacific Railroad right-of-way between Wornum Drive in Corte Madera, across Corte Madera Creek, and on to East Sir Frances Drake Boulevard on a new high-level bridge to Larkspur Landing. The TAC concluded that this option provides the most functional, direct, and enjoyable route for pedestrians and bicyclists. Potential problems with the high-level bridge include maintenance costs and environmental impacts, which have not been analyzed yet, although BCDC has given it preliminary approval.
- Should a high level bridge not be feasible for maintenance or environmental impact reasons, Alternative 1C would be the preferred alignment. This route follows the Northwestern Pacific Railroad right-of-way from the south, crosses over the U.S. 101 northbound Sir Frances Drake off-ramp via a new easement on the north edge of a mobile home park, and crosses Corte Madera Creek on the bent caps of the highway structure.
- The TAC also recommends that the lead agency status of the MOU partners be changed from the City of Larkspur to the Marin County Congestion Management Agency, subject to discussions between those agencies.

Based on the analysis in this report and input from the four participating agencies and the TAC, the following recommendations are made:

1. **Proceed with Phase I.** Continue planning, design, and implementation of the Phase I segment of the project, which is a new Class I pathway on the NWP right-of-way from Wornum/Redwood Highway to the Marin RV Park, and from that point to a new easement on the perimeter of the RV Park to Redwood Highway. This effort includes obtaining a new easement on the perimeter of the Marin RV Park, and possibly modifying or removing some existing tenants on the NWP right-of-way at the end of Industrial Way to allow for a pathway. This would provide a new Bay Trail segment, and enhance access to the existing sidewalk on the U.S. 101 Corte Madera Creek overcrossing.
2. **Seek Policy Guidance.** The decision to proceed with Alternative 1B is a policy decision among the four member agencies participating on this project. Staff from each of the agencies should provide their recommendations in a Staff Report, supported by the TAC recommendations. Each of the alternatives has significantly different costs, advantages,

and disadvantages. Policy guidance is required as to the feasibility and desirability to take on new maintenance responsibilities for a major new structure over Corte Madera Creek.

3. **Identify an Implementation Agency.** The funding application and MOU for the project states that Marin County will take the lead in implementing this project. The MOU states: "The City of Larkspur will request that the Marin County Congestion Management Agency consider assuming responsibility for subsequent projects to complete the work initiated by this grant, as the Congestion Management Agency generally coordinates multi-jurisdictional projects." The partners on this project need to resolve the issue of who will lead the implementation phase.
4. **Proceed with Planning and Design.** Continue working with Caltrans and other agencies in the development of plans and designs for Alternative 1B. Work with the four partner agencies to ensure good connectivity southward into Corte Madera, and northward linking to the Cal Park Tunnel project.



All variations of Option One start at Old Redwood Highway and Wornum Drive. Each follow the NWP ROW to the north towards the existing trestle over Corte Madera Creek.

1A New drawbridge and overcrossing of Sir Francis Drake Boulevard on alignment of existing trestle with ramp connection to SFDB paths.

1B New fixed bridge with channel clearance to allow vessels free passage beneath and overcrossing of Sir Francis Drake Boulevard on alignment of existing trestle with ramp connection to SFDB paths.

1C Path diverges from NWP ROW between mobile home park and Greenbrae Boardwalk to new path alongside US 101/SFDB off-ramp, leading to an overcrossing of Sir Francis Drake Boulevard.

Larkspur Trestle Bike Path Option 1

10/02

INTRODUCTION

OVERVIEW

The Central Marin Ferry Connection (CMFC) project was first identified in the Marin County Bicycle and Pedestrian Master Plan (2000) as one of the top 25 most important projects in Marin County. This project is located on the east side of U.S. 101 between the East Sir Francis Drake Boulevard (ESFD) corridor on the north and the communities of Larkspur and Corte Madera on the south. The U.S. 101 overcrossing of Corte Madera Creek currently offers the only bicycle and pedestrian connection in this part of Central Marin County. This connection consists of a narrow sidewalk on the east side and a narrow separated pathway on west side of the highway that requires bicyclists to dismount and places users very close to high-speed traffic. The gap also impacts connections to Larkspur Landing, Corte Madera and communities south, and Greenbrae and communities to the west. Surveys and workshops in Marin County have consistently indicated that this is one of the major barriers in the County, especially for people trying to walk or bicycle to the Larkspur Ferry Terminal.

PROJECT PURPOSE

In early 2002, the City of Larkspur received a Bay Trail Planning Grant to initiate research into this project. Alta Planning + Design was hired to review the five corridor alignment options mentioned in the Marin County Bicycle and Pedestrian Master Plan, develop and eliminate others as relevant, and to recommend a preferred alignment. This study and accompanying preliminary design documents are the result of that planning grant.

PROJECT METHODOLOGY

The Feasibility Study consisted of the following steps to review the existing corridor options and develop a preferred alignment:

- A Technical Advisory Committee (TAC) was formed at the start of the project to guide the pathway alignment selection process. The TAC consisted of representatives from the City of Larkspur; Town of Corte Madera; County of Marin; Golden Gate Bridge, Highway, and Transportation District; Association of Bay Area Governments; California Department of Transportation (Caltrans); Marin County Bicycle Coalition; San Francisco Bay Conservation and Development Commission; and Alta Planning + Design.

- Two basic options, each with four sub-options, were developed for consideration by the TAC. These eight variations were ranked by the TAC according to agreed-upon criteria

in order to compare their characteristics. The options were reduced to two primary options, each with three sub-options, as a result of the ranking process.

- A public meeting was held on November 7, 2002, at the Drakes Landing Community Room in Greenbrae. The consultants presented the pathway options under consideration, distributed surveys, and recorded public comments. The public meeting was advertised in local newspapers, on agency websites, and on flyers distributed or mailed to local libraries, bike shops, other local businesses, residential mailboxes, and community bulletin boards.

- The TAC and the project consultants walked the project site to evaluate the alternatives and perform field review.

- The one-page, five-question survey was distributed at the public meeting as well as posted on several agencies' and the consultant's websites.

- The consultant produced this preferred alignment recommendation report for the City of Larkspur based on the public meeting input, survey results, and TAC comments. Three preferred alignments were selected for further evaluation in the forthcoming phases of the CMFC project.

BACKGROUND

PROJECT SETTING AND HISTORY

This chapter provides a description of existing conditions along the study corridor. Information is based on field visits, existing planning documents, aerial photographs, maps, and conversations with city, county, Caltrans, and other agency staff.

Figures 1 and 2 show the location of the project site and a detailed view of the project corridor.

The project corridor follows Redwood Highway and is less than one mile in length between Wornum Drive on the south and East Sir Francis Drake Boulevard to the north. The current bicycle and pedestrian facilities lack shoulders and sidewalks in some areas, are narrow and circuitous for users connecting to the ferry terminal, and do not provide a direct crossing of East Sir Francis Drake Boulevard. Several existing multi-use paths link to the corridor from the surrounding communities.

North of the study corridor, the County is studying a potential bicycle/pedestrian linkage to San Rafael through the abandoned Cal Park Tunnel. The County of Marin has acquired funds to rehabilitate the old railroad tunnel to connect a proposed Northwestern Pacific Railroad right-of way route and the Larkspur Ferry Terminal with Andersen Drive in San Rafael.

OVERVIEW OF CORRIDOR

The CMFC project corridor extends from Wornum Drive at Redwood Highway to the north side of East Sir Francis Drake Boulevard. The current corridor is approximately .7 miles long, and lies within the jurisdictions of the City of Larkspur, the Town of Corte Madera, and the County of Marin. The key components of this corridor are described here.

REDWOOD HIGHWAY

Starting at its southernmost point at Wornum Drive, approximately one-half mile of the corridor follows the Redwood Highway frontage road. From Wornum Drive to Industrial Way, shoulders exist only occasionally and bicyclists must use the travel lanes. Sidewalks are not provided

The south end of the CMFC corridor at Wornum Drive and Redwood Highway, looking north.

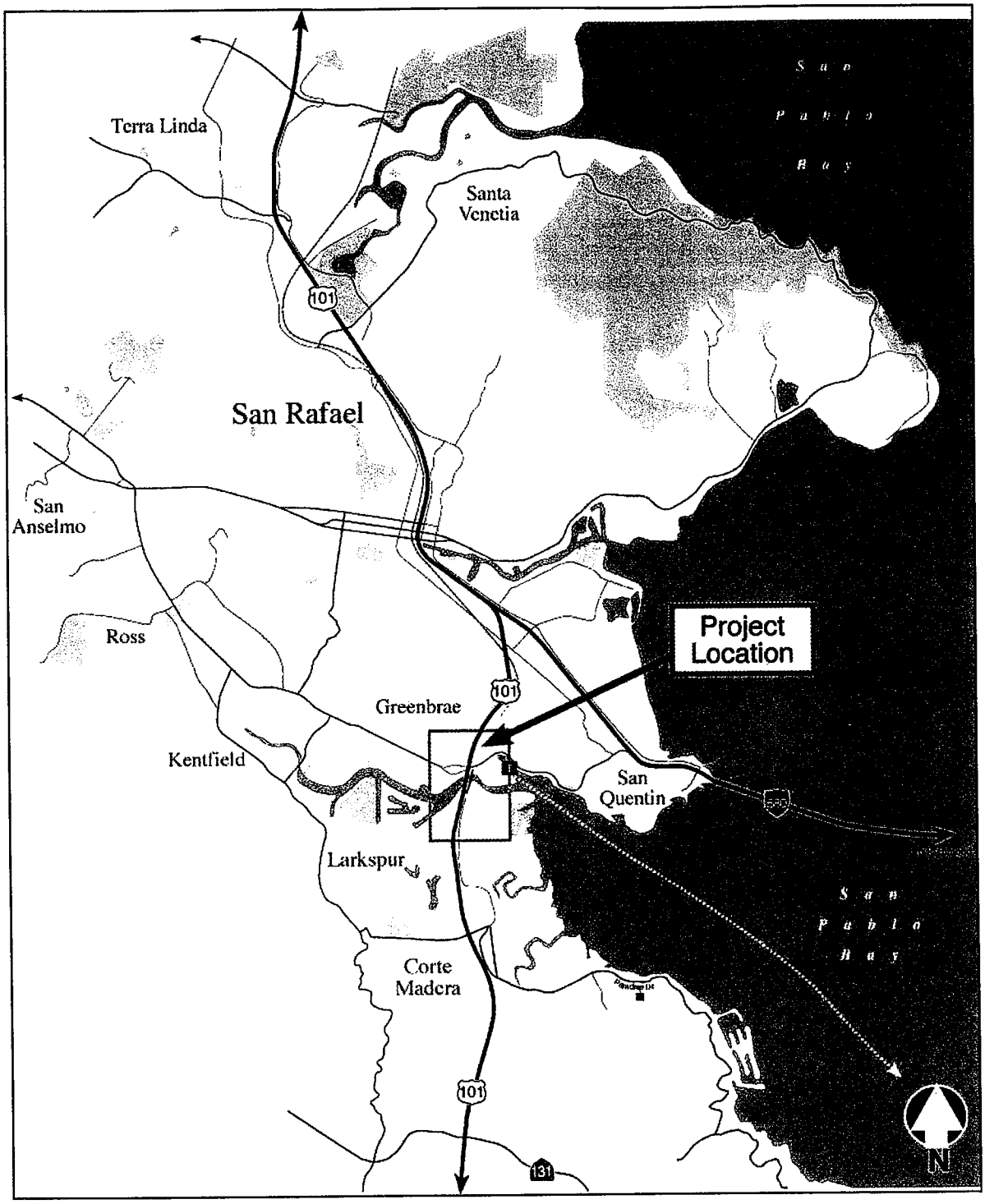
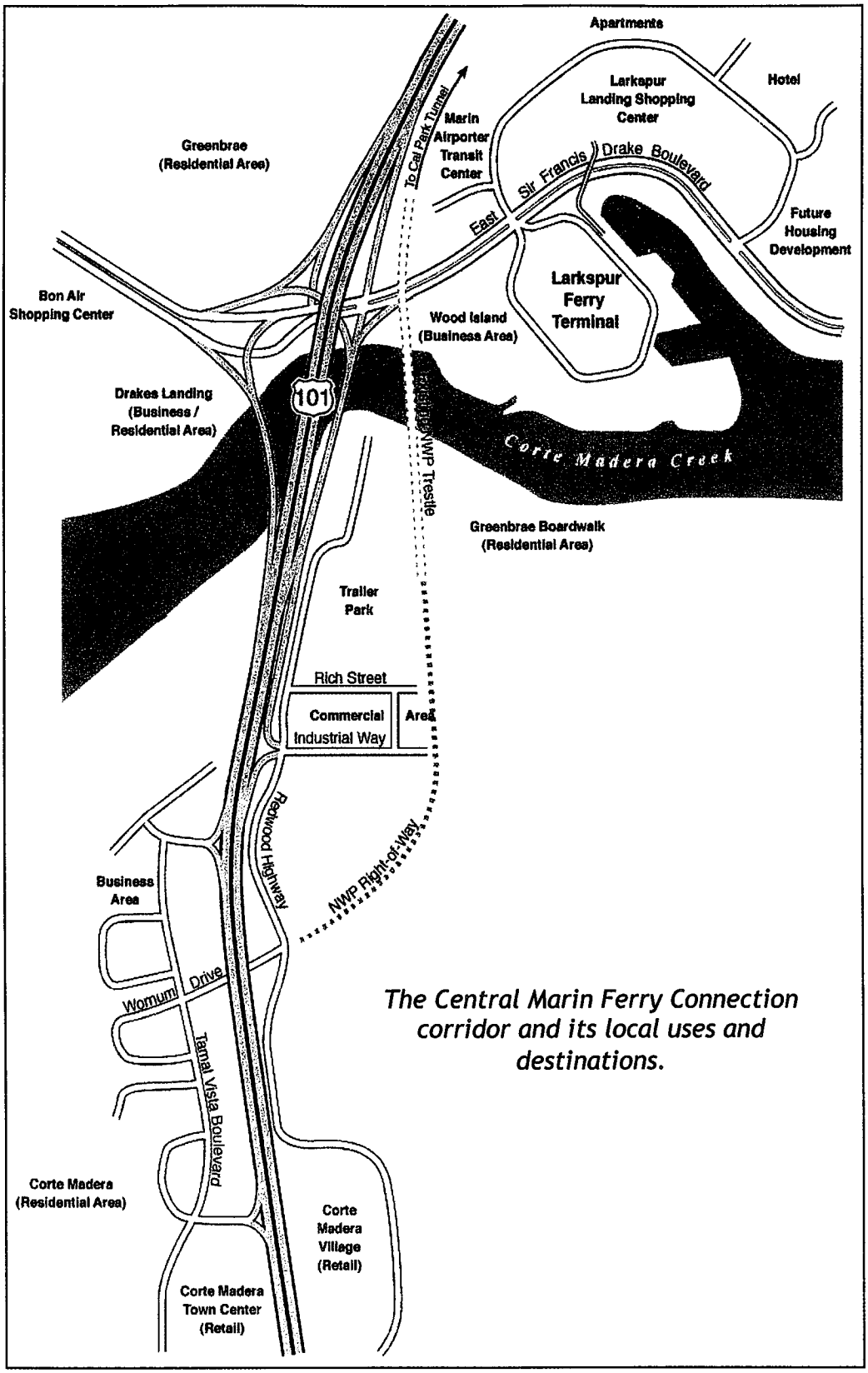


Figure 1 - Location Map



The Central Marin Ferry Connection corridor and its local uses and destinations.

Figure 2 - Project Corridor

except along the Marin Central Plaza shopping center property on the east side of the road. This section of road carries heavy traffic volumes up to the Highway 101 on-ramp at Industrial Way.

North of Industrial Way, wide asphalt shoulders are present on the east side of the road, parking is available on the west side, and the road carries a very low traffic volume to the residential communities and small businesses adjacent to it.

U.S. 101 SIDEWALK

Currently, pedestrians and bicyclists on the east side of U.S. 101 must cross Corte Madera Creek on a pathway along the frontage road immediately north of the Industrial Way on-ramp. The path becomes a five-foot wide, unprotected concrete sidewalk immediately adjacent to the travel lanes on the Highway 101 off-ramp for Sir Francis Drake Boulevard. On the north side of the Creek, the sidewalk connects to the existing pathway parallel to East Sir Francis Drake Boulevard. The path and sidewalk segment is slightly over two miles long and posted signs advise bicyclists to walk their bicycles while using the off-ramp sidewalk.

Crossing Corte Madera Creek on the Sir Francis Drake Boulevard off-ramp sidewalk.

NORTHWESTERN PACIFIC RAILROAD CORRIDOR

The Northwestern Pacific Railroad right-of-way makes up the other element of the study corridor. From the 1880s to the 1940s, this corridor was used by electric commuter trains and freight trains on their way to Sausalito and Tiburon. While commuter passenger service was abandoned in the 1940s, local freight service continued until the late 1970s from San Rafael to the Dixie Cup plant on Tamal Vista. After this service was abandoned, the line was purchased by the Golden Gate Bridge District. The tracks, trestle, and drawbridge are still in place.

The City of Larkspur intends to remove a 100-foot portion of the trestle crossing over East Sir Francis Drake Boulevard in order to add an additional traffic lane in the westbound direction of sir Francis Drake Boulevard at the interchange. There are no current plans to alter the remaining trestle south of the road that crosses Corte Madera Creek. The drawbridge is currently locked in an open position to allow through boat traffic.

GOALS AND OBJECTIVES

The overall goal of the CMFC project is to improve bicycle and pedestrian access and connectivity in this corridor.

Local agencies such as the City of Larkspur, Town of Corte Madera, County of Marin, Association of Bay Area Governments, and the Golden Gate Bridge Highway and Transit District (GGBHTD) have their own unique goals for this corridor. This includes improving access, connectivity, and safety for bicyclists and pedestrians; reducing traffic congestion on local roads; and boosting ridership while reducing parking demand at the Larkspur Ferry Terminal. In addition, each agency has other long-term goals and policies that impact this corridor, including potential commuter rail service to the ferry terminal and highway and roadway interchanges along the U.S. 101 corridor.

The following goals and objectives have been developed to help guide the evaluation process in this feasibility study.

Goal 1: The project should improve bicycle and pedestrian connectivity in Central Marin and complete a major gap in the County's alternative transportation trail network and the Bay Trail.

Objective A: Connectivity. Provide links and improve access to connector trails and important destinations along the corridor including commercial/shopping and employment generators at Larkspur Landing, Marin Central Plaza, Bon Air Center, and existing and proposed future residential neighborhoods.

Objective B: Recreation Amenity. Provide improved access to recreational amenities, especially the shoreline and public open spaces, such as the Corte Madera Marsh State Ecological Reserve.

Goal 2: The project should enhance access to the Larkspur Ferry Terminal.

Objective A: Transportation. Provide a transportation benefit to the City and County by offering an effective alternative to the motor vehicle, whether that is for work or recreational trips. Enhance overall transportation mobility and options in the area, especially for commuters trying to reach the Larkspur Ferry Terminal.

Goal 3: The project should provide maximum benefits to the public.

Objective A: Safety. Improve safety conditions for bicyclists and pedestrians in the corridor.

Objective B: Range of User Groups. Maximize the range of potential users of any new facility or service, including users of all ages and abilities. Understand the needs, capabilities, and interests of each user group, and consider this in the design of any solution(s).

Objective C: Function. Maximize the functional aspects of any recommendation in terms of convenience, gradients, availability, directness, access, cost, and connectivity to major destinations.

Objective D: Cost Effectiveness. The project should offer the best combination of effectiveness with lowest capital and operating cost, and should be consistent with existing and future local and regional improvement projects wherever possible.

Objective E: Crossing. Develop a safe, accessible, and direct crossing of East Sir Francis Drake Boulevard.

Goal 4: The project should minimize negative impacts to the environment and local communities.

Objective A: Environment. Design the project so it does not result in significant negative environmental impacts in terms of direct construction impacts (water quality, historical and archaeological resources, etc.) and indirect impacts (increased demand on local resources that are already over capacity, traffic capacity, financial resources, etc.).

Objective B: Property Impacts. Avoid or minimize impacts to private property and residential neighborhoods, including the need to acquire right-of-way or easements.

Objective C: Visual Impacts. Design the project so it does not result in significant impacts to the visual resources of the corridor.

Goal 5: The project should be consistent with adopted policies, standards, and goals.

Objective A: Consistency: Design the project to be consistent with the local, regional, and State adopted standards, policies, and goals, such as Caltrans and ADA.

SUMMARY OF RELEVANT PLANS & POLICIES

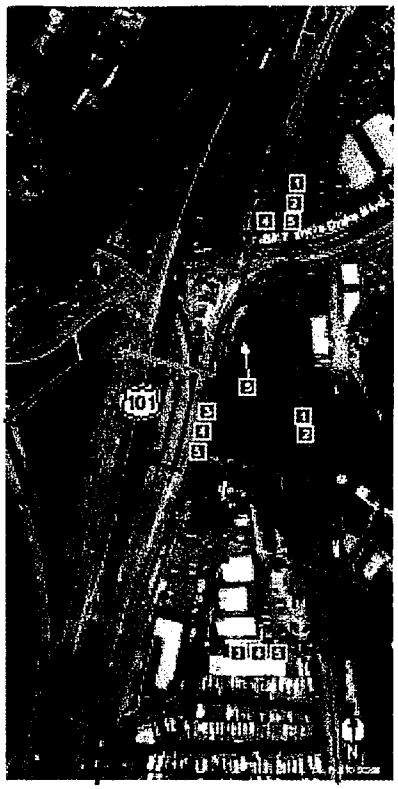
This section discusses the key public agencies involved in the CMFC Feasibility Study, and relevant planning and policy documents prepared by each.

COUNTY OF MARIN

Marin County's 1994 visionary Countywide Plan is currently undergoing an update that is expected to take up to four years of research, community participation, and environmental review to look at current land use and projections for the future of its 520 square miles and population of nearly 247,300. The theme of designing a sustainable future for the County has been selected to guide the preparation of the Plan Update, and the CMFC project is an element of that sustainable transportation vision.

Marin County Bicycle and Pedestrian Master Plan

The Marin County Congestion Management Agency was responsible for initiating the development of the Marin County Bicycle and Pedestrian Master Plan. Although it was not adopted, it was developed with the goal of making bicycling and walking an integral part of daily life in Marin County. A subsequent Unincorporated Marin County Bicycle and Pedestrian Master Plan was adopted in June 2001. Both Plans contain project recommendations to address traffic congestion, safety and general livability within the County, and highlight school children and senior citizens as the two user groups that will benefit most from the improvements. They focus on a primary network of bikeway corridors for intra-city and regional travel, and discuss local priorities for bikeway and pedestrian improvements in each of the incorporated Marin towns. The CMFC was first identified as a recommended project for the County and the City of Larkspur in these Plans.



The five options for the CMFC project as illustrated in the 2000 Marin County Bicycle and Pedestrian Master Plan.

Marin Countywide General Plan

As currently proposed, the update will expand the current elements of the general plan to also include, among other items, a Baylands Protection Corridor element. An Interim Guiding Principal of the Plan Update relevant to the corridor project is as follows:

> **5. Provide efficient and effective transportation.**
> We will expand our public transportation systems to better connect jobs, housing, schools, shopping and recreational facilities. We will provide affordable and convenient transportation alternatives that reduce our dependence on single occupancy vehicles, conserve resources, improve air quality and reduce traffic congestion.
>
> *Examples of Community Indicators: Vehicle miles traveled; bus and ferry ridership and fares; person miles traveled; community walkability; miles and use of bike paths.*

Interim Report: U.S. Highway 101 Interchange with Sir Francis Drake Boulevard

The Marin County Congestion Management Agency commissioned a planning study of options for re-designing U.S. 101 and various on- and off-ramps between Tamalpais Drive and Sir Francis Drake Boulevard. The study, completed by CH2M Hill in May 2002, identifies a preferred alternative (#4) that may have direct consequences for the proposed CMFC project. Alternative #4 shows a new full interchange at Wornum Drive in Corte Madera, replacing the Industrial/Lucky ramps, and widening the East Sir Francis Drake Boulevard northbound off-ramp to two lanes. Both of these changes would impact the feasibility of all CMFC options, and are discussed in greater detail later in this report.

CITY OF LARKSPUR

The City of Larkspur has a population of 12,014 and an area of approximately four square miles. Most of Larkspur is located west of Highway 101 in central Marin County between Corte Madera and Mill Valley to the south and Greenbrae and Kentfield to the north. The project corridor lies within the easternmost portion of Larkspur; a narrow strip of land that parallels the east side of Highway 101 and a small segment of the north shore of Corte Madera Creek that heads east towards the ferry terminal.

City of Larkspur General Plan

The City of Larkspur updated its General Plan in 1990. It is a comprehensive statement of Larkspur's development policies for the city and its sphere of influence. The Plan defines a realistic vision of what the city intends to be in 20 years, and provides guidance to the City Council when making planning decisions. It acknowledged that a joint led effort by Marin and Sonoma counties, was (and remains) underway to consider use of the Northwestern Pacific Railroad right-of-way (parallel to Highway 101's east side and terminating near the Larkspur Ferry Terminal) for some form of future transit–way. The following chapter summaries are relevant to the corridor project:

Land Use, Chapter 2: Enhance the attractiveness and viability of existing commercial areas and ensure that they are accessible by means other than the auto.

Circulation, Chapter 4: Provide safe and efficient transportation facilities for moving people and goods within Larkspur. Encourage attractive alternatives to the use of single-occupant vehicles. At the same time, give *quality of life* and *protection of the environment* a higher priority than "traffic mobility," and do everything possible to ameliorate the negative impacts of local and regional traffic on Larkspur. Improve the connections between the several parts of Larkspur and with neighboring communities.

Environmental Resources, Chapter 6: Preserve and enhance open space features, including marshes and wetlands along San Francisco Bay and Corte Madera Creek, wildlife habitats, view corridors, and ridgelines. Protect open space and shoreline/marsh conservation areas from any degradation that could result from public facility improvements such as roads, paths, sewers, or flood control projects.

Trails and Paths, Chapter 8: Make it easier to move around Larkspur by non-motorized transportation modes. Provide safe, paved, bicycle and pedestrian paths to schools, shopping areas, recreation facilities, and open space preserves. Improve traffic safety for bicyclists and pedestrians. The chapter identifies access to San Rafael along the railroad right-of-way adjacent to Highway 101 as an improvement possibility.

The City of Larkspur also passed Resolution No. 30/01on September 5, 2001, adopting the Marin County Bicycle and Pedestrian Master Plan. The resolution illustrates the City's commitment to incorporating the Plan's goals, objectives and policies for bicycle and pedestrian improvements within the corporate limits of the City. It identifies improvements to the CMFC

project corridor in section 1.C. The City just completed a draft Bicycle Transportation Plan that also includes the Central Marin Ferry Connector as a priority project.

TOWN OF CORTE MADERA

Corte Madera is a relatively small town of 9,100 residents within 4.5 square miles that is divided into an east and west half by Highway 101. The current CMFC corridor does not fall within the boundaries of the Town of Corte Madera, but the existing northern segment of the Bay Trail meets the project corridor's starting point at Corte Madera's north boundary.

Town of Corte Madera General Plan

Since January 2001, the Town of Corte Madera has been in the process of updating its 1989 General Plan. The update is anticipated to take two years to complete. The General Plan highlights bicycle issues pertaining to poor accessibility and inadequate facilities, its role in mitigating the negative effects caused by increasing automobile use, and its value towards improving the quality of life for Corte Madera residents. Its Guiding Policy 5.4.c. states: "Promote programs and measures that will create a safe and comprehensive pedestrian and bicycle circulation system in Corte Madera."

Town of Corte Madera Bicycle Transportation Plan

Corte Madera adopted its Bicycle Transportation Plan in July 2001 as a result of wanting to become a more bicycle-friendly community. It is a coordinating and resource document that will enable the Town to qualify for state and federal funding sources specific to bicycle improvements. The Plan addresses the concern to improve movement between the east and west sides of the town, as well as the desire to improve its bicycle-transit links. The Plan shows an existing and potential bikeway connection through the study corridor, and states, "a Corte Madera Creek crossing (...) are principal elements of a North-South bikeway through Marin County. Construction of a creek crossing will also involve the cooperation of a number of bodies with the Town of Corte Madera."

ASSOCIATION OF BAY AREA GOVERNMENTS

The Association of Bay Area Governments (ABAG) is a governmental agency comprised by the cities and counties of the San Francisco Bay Area. It was established by them in 1961 to protect local control, plan for the future, and promote cooperation on area-wide issues. ABAG was the first Council of Governments in California. ABAG has been designated by the state and federal governments as the official comprehensive planning agency for the Bay Area.

The Bay Trail Plan (1989)

The Bay Trail Plan was adopted by ABAG in 1989 with the goal of developing a 400-mile loop trail around the Bay Area, encompassing spine trails, spur trails, and connector trails. The Plan was prepared pursuant to Senate Bill 100 which mandated that the Bay Trail (1) provide connections to existing parks and recreation facilities, (2) create links to existing and proposed transportation facilities, and (3) be planned in such a way as to avoid adverse effects on environmentally sensitive areas. It contains policies to guide selection of the trail route and

implementation of the trail system. The five policy categories include: Trail Alignment, Trail Design, Environmental Protection, Transportation Access, and Implementation. The Plan recognizes that creation of the Bay Trail depends on cooperation among shoreline property owners; the hundreds of local, regional, state and federal agencies with jurisdiction over the trail alignment; the trusts and foundations operating in the region; and the environmental and recreational interests that closely monitor the Bay Area's changes.

The current adopted Bay Trail alignment in the CMFC project area follows a circuitous route requiring bicyclists and pedestrians to cross over and under Highway 101 using substandard pathways adjacent to highway traffic. The current CMFC project is intended to develop an alternative alignment that will improve this important Bay Trail connection, protect the sensitive environmental resources of the shoreline, while improving accessibility to the Bay.

SONOMA MARIN AREA RAIL TRANSIT

Sonoma Marin Area Rail Transit Commission (SMART) was formed in 1998 with the mission to provide passenger train service to Sonoma and Marin County residents along the Northwestern Pacific (NWP) rail corridor that lies next to Highway 101. Its 12-member commission consists of five representatives from each county. It is responsible for planning, engineering, evaluating, and implementing passenger train service from Cloverdale to a Ferry Terminal that connects to San Francisco (Larkspur, and the proposed Port Sonoma and San Quentin ferry terminals are being considered). Providing passenger rail service to reduce traffic congestion is SMART's primary goal, however, the commission has agreed to add a parallel multi-use trail where the ROW is sufficient to do so. A Bicycle Advisory Task Force has been formed to help evaluate trail design and development.

In 2000, SMART released the Sonoma Marin Rail Implementation Plan that provides SMART with a preliminary plan for train service and an estimated $200 million cost to build the train system. This estimate did not include the cost to construct an adjacent multi-use path since that feasibility study has not yet been completed. SMART hired Parsons Brinkerhoff to conduct an Environmental Impact Study (EIS) and Environmental Impact Report (EIR) in summer 2002. Among the issues examined by the EIS and EIR will be the feasibility of constructing a multi-use path adjacent to the rail line, and the impact of the train on traffic congestion reduction. A Notice to Proceed is expected by the end of September 2002, after which it is anticipated that the EIS/EIR process will take 18 months to complete.

Governor Davis' summer 2002 signing of Assemblyman Nation's AB 2224 consolidates ownership, planning, and control of the NWP right-of-way under SMART, as a new transit agency. SMART's transit operator status began on January 1, 2003, and as a result, any alignments for the CMFC project will have to be approved by SMART. SMART is currently studying commuter rail options including service southward from San Rafael to the Larkspur Ferry terminal. SMART has no current operating plans or options that show trains crossing Corte Madera Creek.

CALIFORNIA DEPARTMENT OF TRANSPORTATION

The State of California, Department of Transportation (Caltrans) is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Caltrans has jurisdiction over the Highway 101 right-of-way and the East Sir Francis Drake Boulevard off-ramp to be reviewed as part of this feasibility study. Caltrans is conducting the following roadway improvement project in the vicinity of the CMFC corridor to reduce traffic congestion on Highway 101 in this area:

HOV Gap Closure Project

The Highway 101 HOV Gap Closure project is intended to address the gap in the High Occupancy Vehicle (HOV) lane that occurs between Tamalpais Drive in Corte Madera and North San Pedro Road in San Rafael. Determining how to locate the HOV lane in the median has been the focus. The entire project is divided into six phases; the Sir Francis Drake Boulevard Interchange falls within Phases 2 and 3 of the project. An EIR has been completed for the whole project, resulting in a set of preferred alignment drawings for the interchange adjacent to the CMFC project. As part of the alignments analysis, Caltrans estimated that widening the existing sidewalk along the East Sir Francis Drake Boulevard off-ramp would cost $1.5 million. This project is currently under construction and there are no known impacts of this project on the CMFC project's preferred alignment.

OTHER RELEVANT AGENCIES

GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT

The Golden Gate Bridge, Highway and Transportation District (GGBHTD) consists of three operating divisions - Bridge, Bus and Ferry - and an administrative District Division. Its mission is to provide a safe, efficient, and reliable means for the movement of people, goods, and services within the Highway 101, Golden Gate Corridor. In carrying out this mission, the District recognizes its responsibility to work as a partner with federal, state, regional, and local governments and agencies to best meet the transportation needs of the people, communities, and businesses of San Francisco and the North Bay areas. The GGBHTD is actively participating in the CMFC project's Technical Advisory Committee to insure that their transportation concerns along the Highway 101 corridor are addressed by the chosen alignment.

Northwestern Pacific Railroad Right-of-Way

The Northwestern Pacific Railroad originally owned and operated the railroad right-of-way that parallels the east side of Highway 101 in the vicinity of East Sir Francis Drake Boulevard. The right-of-way was purchased in the 1980's by Marin County and the GGBHTD with federal and state grants. Both parties are in agreement that the right-of-way should be used for future transportation opportunities. The GGBHTD solely owns the section of right-of-way from East Sir Francis Drake Boulevard south to Paradise Drive in Corte Madera. The Town of Corte Madera owns the east-west curved section of right-of-way (historically known as the Baltimore Park Cut-off) that extends from approximately the east terminus of Industrial Way southwest towards Corte Madera.

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

The 27-member San Francisco Bay Conservation and Development Commission (BCDC) was created by the California Legislature in 1965 in response to broad public concern over the future of San Francisco Bay. The Commission is made up of appointees from local governments and state and federal agencies. Implementation of the CMFC project's preferred alignment will require a permit from BCDC. The Commission's responsibilities include:

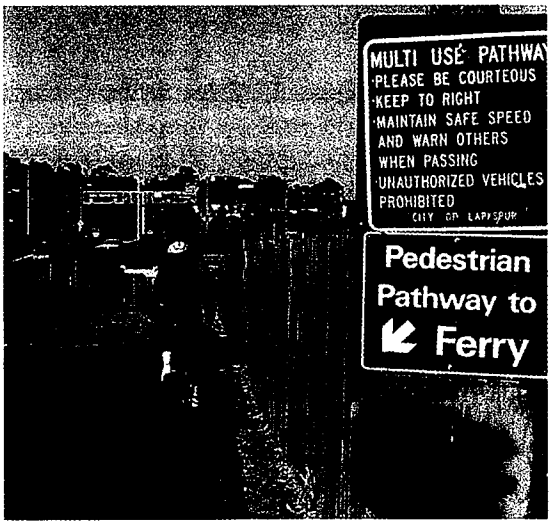
- Regulating all filling and dredging in San Francisco Bay (which includes sloughs and certain creeks and tributaries);
- Regulating new development within the first 100 feet inland from the Bay to ensure that maximum feasible public access to the Bay is provided;
- Minimizing pressures to fill the Bay by ensuring that the limited amount of shoreline area suitable for high priority water-oriented uses is reserved for ports, water-related industries, water-oriented recreation, airports and wildlife areas; and
- Administering the federal Coastal Zone Management Act within the San Francisco Bay segment of the California coastal zone to ensure that federal activities reflect Commission policies.

NEEDS ANALYSIS

This chapter provides an overview of the user needs for the Central Marin Ferry Connection (CMFC) project. The need for an improved facility connecting Larkspur, the Larkspur Ferry Terminal, and other destinations is called out specifically in the 2000 Marin County Bicycle and Pedestrian Master Plan, and input from local agencies and the public due to the existing conditions and the potential to serve as a viable transportation and recreation facility.

USER GROUPS

The project corridor is regularly used by a wide variety of bicyclists and pedestrians because of its close proximity to the residential communities of Larkspur, Corte Madera, and Greenbrae, several shopping centers, employment centers, recreational areas, and the Ferry Terminal. Short distances to all these destinations are the most likely to generate trips on foot or bicycle. Typically, destinations less than three miles from residential areas are attractive for bicycle trips and destinations one-half mile or less attracts pedestrian trips.



A cyclist heading north towards the Corte Madera Creek off-ramp crossing.

Each user group has specific needs that will directly affect the planning and design of the CMFC project. For example, many less experienced bicycle riders prefer to use multi-use trails (also known as Class I bike paths) or lower-traffic side streets rather than busy arterials with no shoulders. Experienced bicyclists are often willing to trade more traffic and higher traffic speeds for a more direct route to their destination. This project should be designed for the greatest variety of user groups that will potentially use this corridor including students going to school, shoppers running errands, recreational and commuting bicyclists, pedestrians, hikers, dog walkers, in-line skaters, parents pushing strollers, seniors, children, and the disabled community.

COMMUTER NEEDS

Commuters in this case will consist of employed adults and students of all ages. Commute trips between work and home typically account for about one-third of all weekday person trips. This represents a substantial opportunity for bikeway and pedestrian usage, especially where links between commercial and residential areas exist. Common commute characteristics include:

- Commuter trips usually range from several blocks to ten miles.
- Commuters typically seek the most direct and fastest route available.
- Commute periods typically coincide with peak traffic volumes and congestion, increasing the exposure to potential conflicts with vehicles.
- Places to safely store bicycles are of paramount importance to all bicycle commuters.
- Major commuter concerns include changes in weather (rain and heavy fog), riding in darkness, personal safety and security.
- In general, a primary concern to all bicycle commuters are intersections with no control signs (i.e., stop or yield signs) or signal controls.
- Commuters generally prefer routes where they are required to stop as few times as possible, thereby minimizing delay.

Commuters who currently drive to the Larkspur Ferry Terminal from nearby neighborhoods in Larkspur and Corte Madera may also face parking shortages and traffic delays at the ferry terminal. Use of a dedicated facility may encourage some commuters who currently drive to walk or bicycle, thereby offering commuters saved resources, less traffic congestion, and reducing the demand for parking.

RECREATIONAL NEEDS

Recreational use generally falls into one of three categories: exercise, non-work destinations (such as shopping or libraries), and sightseeing. Recreational bicyclists can be a varied user group in and of themselves, since the term encompasses a broad range of skill and fitness levels, from a racer who does 100-mile rides each weekend, to a family with young children who occasionally want to ride a couple miles down a quiet trail. Regardless of the skill level of the recreational user, directness of route is typically less important than being in scenic surroundings, having amenities like restrooms and water fountains, and being on routes with few traffic conflicts. Visual interest, shade, protection from wind, moderate gradients, and artistic or informational features also have a much higher value.

All recreational corridor users require some basic amenities to have a comfortable experience and to want to return. They include dedicated facilities (such as sidewalks or bike lanes), clear destination and intersection signage, and even surfaces. The aesthetic component of a facility is very important to most recreational users. In other words, most people prefer to walk or bicycle in pleasing surroundings. Some of the CMFC options will offer users more pleasing surroundings (such as along the wetlands) than others (such as directly along U.S. 101).

While the CMFC project itself is probably too short to serve as a major recreational destination, it will connect with numerous other local pathways to form a major network. This includes the Corte Madera Creek pathways extending from San Quentin to Upper Ross Valley and points west, the NWP Cut-Off pathway from Redwood Highway to the NWP Railroad Trail in Corte Madera and Larkspur, and the unpaved pathway extending southward to Paradise Drive. The

CFMC project could provide local residents with access to at least 4.9 miles of separated pathway—the longest segment in Central Marin County. A summary of connecting pathways and bikeways is provided below.

CONNECTING FACILITIES

As a gap closure project, the connecting facilities to the CMFC are very important. At its southern point at Wornum Drive, two paths currently exist:

- Corte Madera's Bay Trail segment coming north from The Village Shopping Center consisting of an eight-foot wide asphalt Class I path that has its northern terminus at Wornum Drive, and

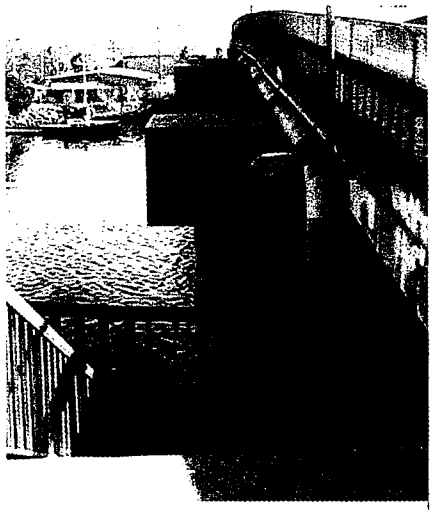
- A paved Class I path leading from Larkspur and Corte Madera from the west that follows the former Northwestern Pacific Railroad tracks, crosses the recently installed High Canal Bridge, and parallels Wornum Drive on the south side to Redwood Highway.

Corte Madera's Class I path looking south to the Village Shopping Center.

Approximately .3 miles north of Wornum Drive, a pedestrian and bicycle overcrossing of Highway 101 exists that allows access from Corte Madera on its west side to the project corridor and the Marin Central Plaza shopping center. The bridge has spiral ramps located immediately north of the Highway 101 on-ramp, near the intersection of Industrial Way and Redwood Highway. A sidewalk from the base of the bridge's ramp leads to the corner of Industrial Way and Redwood Highway.

At the north end of the corridor where Highway 101 and East Sir Francis Drake Boulevard intersect, a connector path also currently exists:

- A paved Class I multi-use path heads east towards the Larkspur Ferry Terminal along East Sir Francis Drake Boulevard. This path also continues just under the freeway off-ramp and heads west towards Greenbrae, parallel to Corte Madera Creek. Access to this second path is by a stairway that leads down from the northern end of the corridor's off-ramp sidewalk to a 10-foot wide boardwalk that crosses over the creek directly under the East Sir Francis Drake Boulevard off-ramp. This existing path provides bicycles and



The stairs leading down to the Corte Madera Creek boardwalk.

pedestrians with a protected east-west route at the maze of freeway on- and off-ramps.

CONNECTIONS TO THE NORTH

There is currently no direct route north to San Rafael for bicyclists or pedestrians from the CMFC study area. The existing NWP trestle that crosses over East Sir Francis Drake Boulevard has been suggested as a possible crossing location and structure. The City of Larkspur is planning to remove a 100-foot span of the trestle crossing to provide an additional traffic lane there.

Two equally challenging bicycle routes to the east and west of the CMFC corridor are currently available for crossing East Sir Francis Drake Boulevard and reaching San Rafael, as described below. These routes are seldom used by pedestrians because of the inclines, lack of sidewalks, and long walking distances that would be required: approximately 4.5 miles on the eastern route and three miles on the western route.

East to San Rafael

Currently bicyclists can travel east to San Rafael via East Sir Francis Drake Boulevard to Andersen Drive. The route from the ferry terminal to Andersen Drive is 1.4 miles long, half paved Class I path on the south side of East Sir Francis Drake Boulevard and half along a paved shoulder, with a hill climb at its terminus to an un-signalized left turn lane at Andersen Drive. At that point, the route continues uphill on Andersen Drive but soon levels out into downtown San Rafael. The three miles of Andersen Drive have bike lanes. The combination of fast moving east bound East Sir Francis Drake Boulevard traffic, fast moving west bound freeway off-ramp traffic, and lack of turn signal at Andersen Drive make this a hazardous crossing. Overall, this bike route is inconvenient, lengthy, and challenging for all but the most experienced bicyclists.

West to San Rafael

This alternate method of reaching San Rafael involves bicyclists crossing under the Highway 101 overpass on the south side of the road to the Corte Madera Creek multi-use path. The path leads to the Sir Francis Drake Boulevard/Eliseo Drive intersection where a signal provides a crossing to the north side of the road. A protected sidewalk on the north side of the road can be used to the base of Wolfe Grade from the intersection; no bike lanes are provided. Wolfe Grade involves a steep hill on a winding route prior to a descent into downtown San Rafael. Wolfe Grade has minimal shoulders, a steep grade, and many blind curves that add to the difficulty of this route. This bike route is similarly inconvenient, lengthy, and challenging for all but the most experienced bicyclists.

North to San Rafael - Proposed Pathway

Due to the difficulties outlined with the East and West routes to San Rafael, there has been an effort to secure funding to develop a pathway that would connect with the Central Marin Ferry Connection Project and proceed through the Cal Park Hill Tunnel along the railroad right-of-way. In the spring of 2002, the County of Marin was awarded two grants totaling $3.9 million for construction of the Cal Park Hill Tunnel and the pathways that would extend south to the Central Marin Ferry Connection Project and north to Andersen Drive. As the lead agency for this project, the County of Marin has formed a Technical Advisory Committee including the

County of Marin, City of Larkspur, the City of San Rafael, the Golden Gate Bridge District, SMART, and a representative from the Marin County Bicycle Coalition. At a November 2002 meeting, a feasibility report was presented by Nelson/Nygaard Consultants, and the TAC unanimously decided to move forward with design of the project. The County of Marin continues to seek the balance of funding for the project; the total cost has been estimated at $7 million.

SURROUNDING LAND USES & DESTINATIONS

Surrounding land uses directly impact potential usage on any bicycle or pedestrian facility. The CMFC corridor primarily extends through business and commercial centers as it connects to the Larkspur Ferry Terminal. The various land uses adjacent or proximal to the trail, and any connectivity issues related to them, are summarized below.

RESIDENTIAL COMMUNITIES

Residential communities occupy the east side of Redwood Highway within the CMFC corridor. The Golden Gate Trailer Park is located at Wornum Drive on the south end of the CMFC corridor. The Marin Park Mobilehome and RV Park occurs midway along the corridor, and the Greenbrae Boardwalk houseboat community is located at the north terminus of Redwood Highway. Community access is a boardwalk that crosses under the existing NWP trestle and extends east to residents' homes. Residents of all these local communities are potential users of the CMFC corridor for local errands, transportation connections, and commuting.

The gateway at the Greenbrae Boardwalk community.

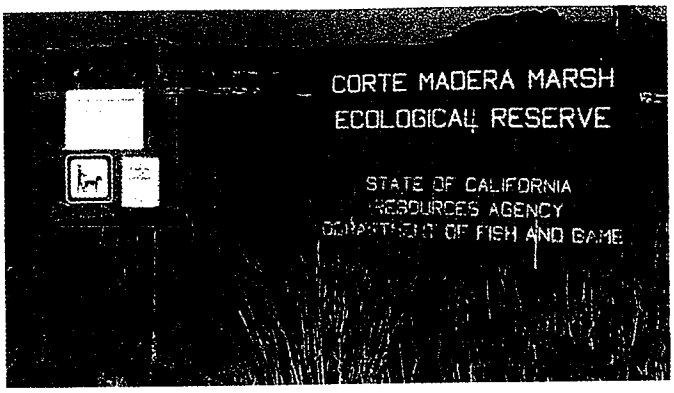
Along the west side of Highway 101 in Corte Madera and Larkspur are primarily residential communities consisting of single-family houses and small apartment complexes. The existing connector paths from these neighborhoods provide excellent access to the CMFC corridor via the bike path on Wornum Drive or the pedestrian over crossing at Industrial Way. The improvement of this section of the Bay Trail will enhance conditions for the already well-used surrounding trail system.

COMMERCIAL CENTERS

Retail shopping and small businesses occupy portions of the east side of Redwood Highway. The Marin Central Plaza shopping center acts as a hub with a variety of chain store retailers. Other local small businesses include automotive repair shops, public storage facilities and a roofing company. The Bon Air shopping center provides additional retail and grocery stores on

Sir Francis Drake Boulevard to the west of the CMFC corridor. Larkspur Landing shopping center is to the northeast of the corridor on East Sir Francis Drake Boulevard.

CORTE MADERA MARSH ECOLOGICAL RESERVE



The ecological reserve's entrance signage.

The marsh covers approximately 620 acres of publicly-owned open space, and has been owned and managed by the California Department of Fish & Game since the 1970s. The entire reserve property is on the east side of the NWP right-of-way. The adjacent flood control basin to the west of the reserve is owned by the Town of Corte Madera. The reserve provides habitat for endangered species including the largest southern Marin population of Clapper Rail, as well Black Rail and Salt Marsh Harvest Mice. Public access to the marsh is available at the eastern end of Industrial Way where a gravel parking lot abuts the existing levy trail system. Fish & Game would need to be consulted for any proposed trail adjacent to the reserve that would be at grade level. Separation of trail users from the aquatic environment are of paramount concern.

LARKSPUR FERRY TERMINAL

Golden Gate Transit owns and operates the Larkspur Ferry Terminal that operates ferries to San Francisco seven days a week. The terminal acts as a transportation hub where transfers to Golden Gate buses are possible. Bicycles are welcome aboard all Golden Gate Ferries on a first-come, first-serve basis. The Catamarans can accommodate 15 bicycles and the larger capacity vessels can accommodate 25 bicycles. The Larkspur Ferry Terminal has four bicycle racks that hold a total of 40 bikes and eight bicycle lockers. A Bike Station has been proposed as a way to improve accommodations for bicycle commuters.

LARKSPUR LANDING MIXED USE CENTER

The Larkspur Landing condominium community occupies the space of a former rock quarry on the north side of East Sir Francis Drake Boulevard. The shopping center south of the condos provides retail and commercial services of all kinds, and a movie theater and office complex exist immediately adjacent to the shopping center on Larkspur Landing Circle. Several large office buildings in the area provide a base of employment for the area. An affordable housing development is proposed in this area, as well. A well-used 10-foot wide concrete bicycle and pedestrian bridge crosses East Sir Francis Drake Boulevard connecting the shopping center to the ferry terminal. It provides a protected crossing for both pedestrians and bicyclists.

TRAFFIC VOLUMES

The existing roadways in the study area - Redwood Highway, Wornum Drive, and East Sir Francis Drake Boulevard - have low to heavy traffic volumes. Table 1 illustrates traffic volumes on the two roads for which data is available.

Table 1
2002 Traffic Volumes on Project Corridor

Description	Peak Hr.	AADT
Redwood Highway (from Wornum Drive to Industrial Way)	1,370	14,500
East Sir Francis Drake Boulevard (US 101 to Larkspur Landing Circle)	3,900	47,250

Peak Hr. = Peak hour traffic volume.
AADT = Annual average daily traffic volume. The total volume for the year divided by 365 days
Source: W-Trans

COLLISION DATA

Collision data was collected for the same three primary roads in the vicinity of the CMFC corridor to review the patterns of automotive and bicycle incidents. No pedestrian incidents have been recorded in these areas. The following table indicates the past three years of collision history for the project corridor.

Table 2
Automotive and Bicycle Collisions on Project Corridor

Location	Year	Total Collisions	Bicycle Involved
Wornum Drive (from Tamal Vista Blvd. to Redwood Hwy.)	1999	1	0
	2000	1	0
	2001	1	0
	2002	2	0
Redwood Highway (from Wornum Drive to US 101 on-ramp)	1999	8	1
	2000	6	1
	2001	2	1
	2002	1	0
East Sir Francis Drake Boulevard (from US 101 off-ramp to I-580 on-ramp)	1999	9	0
	2000	3	0
	2001	4	0
	2002	10	1

Source: W-Trans, Twin Cities Police Department

PROJECTED USAGE

One of the goals of the CMFC project is to maximize the number and variety of user groups who will benefit from it, including recreational and commuting user groups. The selection of the preferred alternative will impact the number and diversity of users who will be attracted to the corridor.

The 2000 Census found that approximately 1.9% of work trips were made by other means (including bicycles) in Marin County and 3.0% of work trips were made on foot. Nationally these percentages were 1.2% and 2.9% respectively; statewide for California they were 1.9% and 2.9% respectively. In addition, bicycling is one of the most popular forms of recreational activity in the United States. The Bureau of Transportation Statistics' October 2000 survey found that of the 41 million people riding bicycles (almost 15% of the 281,421,906 national population (Census 2000)), 54 percent are bicycling for recreation and 35 percent are bicycling for exercise. The 2001 *American Sports Data Study* by the Sporting Goods Manufacturer's Association tallied 84,182,000 national recreational walkers (almost 30% of the national population). If nothing else, this indicates a latent demand for connected trails and user facilities.

The 2000 Marin County Bicycle and Pedestrian Master Plan conducted user counts in the CMFC project area. The counts identified 4 bicycles and 75 pedestrians using the Corte Madera Creek crossing within one hour on weekdays, and 30 bicycles and 90 pedestrians within one hour on a weekend.

The Larkspur Ferry Terminal Access Improvement Study completed for the Golden Gate Bridge District in 1996 conducted surveys that identified that 10% of passengers were arriving from Larkspur and five (5) percent were arriving from Corte Madera. Of the total number of passengers surveyed, seven (7) percent of Larkspur ferry riders arrived on foot, and two (2) percent arrived by bicycle. Four (4) percent of the survey respondents said they would walk or bike to the terminal more often if parking was not provided for them. A more recent 1998 ferry user survey showed that six (6) percent of Larkspur ferry riders arrive on foot, and one (1) percent arrive by bicycle.

The Golden Gate Bridge District currently operates 42 weekday ferry crossings between Larkspur and San Francisco and carries an average of 4,581 passengers daily (FY 2001/2002). Based on the previous survey findings, 690 passengers (15 percent of the daily passenger count) are currently arriving from Larkspur and Corte Madera. Of the total ferry passengers, 322 (seven percent) arrive on foot or by bicycle. Based on the 1996 survey findings, it is estimated that an additional 184 passengers (a four percent increase) will walk or bike to the Larkspur Ferry Terminal daily as a result of the CMFC project improvements. At a vehicle occupancy rate of 1.1 persons per vehicle, this would equate to a savings of about 167 parking spaces and 334 weekday trips.

In addition, since the CMFC project will link a network of existing pathways and bikeways to form the longest continuous system in Marin County, recreational and discretionary usage is expected to increase tremendously. Based on existing counts of bicyclists and pedestrians and comparisons with other pathways in Marin such as the Tiburon Bike Path, we estimate future use

of the one-mile CMFC corridor to be approximately 316,000 annually. In comparison, an estimated 324,000 people use the two-mile long Tiburon bike path annually.

The following tables show the existing and projected pedestrians and bicyclists using the Corte Madera Creek crossing for Alternatives 1A and 1B.

Table 3
Existing and Projected Walking and Bicycling: Corte Madera Creek Crossing
Average Daily Total

CURRENT USE (2002)

	Destinations		
	Larkspur Ferry	Other	Total
Weekdays			
Pedestrians	41 /1	409 /2	450
Bicyclists	7 /1	23 /2	30
Weekends			
Pedestrians	26 /1	574	600
Bicyclists	4 /1	196 /2	200

Sources:

/1 Larkspur Ferry Terminal Access Study, 1996.

/2 Marin County Bicycle & Pedestrian Master Plan, 2000.

FUTURE USE (2002)

	Destinations			
	Larkspur Ferry	Other	Total	Using New Crossing
Weekdays				
Pedestrians	135	765	900	675
Bicyclists	23	37	60	45
Weekends				
Pedestrians	85	1,115	1,200	900
Bicyclists	15	385	400	300

TOTAL ESTIMATED ANNUAL CMFC USERS: 316,560

TOTAL ESTIMATED ANNUAL TIBURON BIKE PATH USERS: 324,054

USER NEEDS

SURVEYS

A total of nine survey responses were received and tabulated for this study as of November 15, 2002. A copy of the survey is shown in Figure 3. The results to the five questions were as follows:

- 89 percent of the respondents prefer off-street multi-use paths over on-street bicycle lanes or bike routes.
- The respondents' level of bicycling and/or walking in the corridor varies from 33 percent using it daily, 22 percent using it one to six times a week, 33 percent using it one to three times a month, and 11 percent never using it.
- Users' corridor trip purposes vary between recreation (88 percent), work (55 percent), shopping (55 percent), and other (22 percent).
- Destinations reached by trips within the corridor include: Larkspur Ferry Terminal (44 percent), Larkspur Landing Shopping Center (44 percent), Marin Central Plaza Shopping Center (33 percent), Corte Madera Marsh Reserve (44 percent), and other locations (55 percent).
- Reasons for not using the corridor more often include concerns about safety (77 percent), lack of facilities (88 percent), route too circuitous (66 percent), lack of bicycle parking/storage (44 percent), weather/darkness (44 percent), need for car (33 percent), and other (22 percent).

PUBLIC WORKSHOP STATED NEEDS

Approximately 30 individuals attended the November 7, 2002 public workshop. A summary of the comments received by the participants is listed below.

- An overwhelming preference for an **alignment on the Northwestern Pacific Railroad right-of-way** for reasons of aesthetics, more possible users, and separation from traffic.
- A **level crossing of the creek** on the right-of-way alignment.
- Preservation of the **right-of-way alignment for future transit use.**
- Support for a Corte Madera Creek crossing **separated path on the off-ramp bent caps.**

Bicycle and Pedestrian User Survey

City of Larkspur – Central Marin Ferry Connection project

Date Completed: _____

The City of Larkspur is in the process of improving a segment of the North-South Bikeway and the Bay Trail to eliminate a gap in the County's alternative mode transportation network. This survey is intended to learn more about residents' preferences of multi-use facility types. **Please return all surveys no later than Monday, November 11, 2002 to:**

Alta Planning + Design
707 C Street
San Rafael, CA 94901
(415) 482-8660 phone
(415) 482-8603 fax

Questions:

1. Please rank your preference (1 to 3, 1 being highest) for bicycling and/or walking on:

off-street multi-use paths _____ on-street bike lanes _____ or, bike routes (local streets) _____

2. Describe your current level of bicycling and/or walking in the corridor:

At least 1x per day ____ 1-6x per week ____ 1-3x per month ____ Very rarely ____ Never ____

3. Describe your bicycling and/or walking trip purpose in the corridor (check all that apply):

Work ____ School ____ Shopping ____ Recreation/exercise ____ Other _____

4. Describe your specific destinations within the corridor (check or describe all that apply):

Larkspur Ferry Terminal ____ Larkspur Landing Shopping Center ____

Marin Central Plaza Shopping Center ____ Corte Madera Marsh Reserve ____

Other _____

5. Rank the reasons you don't walk or ride in the corridor more often: (1 to 7, 1 being highest)

Concerns about safety _____ Lack of facilities (e.g. paths, bike lanes, routes) to use _____

Route too circuitous _____ Lack of bicycle storage/parking _____ Weather/darkness _____

Need access to car _____ Other _____

Comments: (for longer comments, feel free to attach additional pages to this survey)

_____

_____

_____

Figure 3 - User Survey

PROJECT ALTERNATIVES

This chapter identifies the criteria used to evaluate six options, describes the individual alignment components, evaluates the alignments in detail, and outlines the three preferred alignments and the final recommendation.

EVALUATION CRITERIA

A decision matrix with clearly described criteria and scoring was used to evaluate each project alternative. The evaluation criteria were based on the overall project goals and were weighted to reflect the relative importance of each category. Each criterion had a weighting factor reflecting its relative importance from 0 (low benefit or negative impact) to 5 or 10 (high benefit or low negative impact) depending on the relative importance. This criterion was then used to evaluate each of the alternative alignments.

The criteria used for the CMFC alternatives was as follows:

MOST IMPORTANT CRITERIA (0-10 POINTS)

Vehicle Conflicts and User Safety

Conflicts with motor vehicles can be a major impediment to use by less experienced and capable users, especially recreational users, children, and the elderly. Several of the alternatives involve either the use of Redwood Highway and/or crossings of roadways, intersections, and parking lots. Alternatives that avoid or minimize these conflicts would rate higher than those that don't.

Functionality / Access

People using the project for transportation purposes will resist using a facility that does not provide a direct connection to the Larkspur Ferry Terminal or other destinations, has significant grades, is not easily accessible, or requires changes from a multi-use path to riding on busy streets.

Usage

The project should appeal to the widest variety of users possible. Multiple users include bicyclists, walkers, joggers, dog walkers, in-line skaters, and others. Some of the alternatives are expected to attract a broader cross section of users, and more users overall, than others

Cost

Cost of the alternative is always a critical component, especially where crossing improvements, fencing, signals, or other expensive infrastructure improvements are being considered. What are the estimated capital and operating costs for developing this alignment? Alternatives that had

lower capital and operating costs, whose costs were more certain, and who would qualify more easily for available funding would score higher than those that don't.

Compatibility with Future Transportation Plans

An alignment may or may not be compatible with future planned or proposed transportation projects. For the Central Marin Ferry Connection project, the potential projects include a new Highway 101 interchange at Wornum Drive, including improvements to the East Sir Francis Drake Interchange, a new roadway connecting Wornum Drive with ESFD, and a new rail transit connection to the Larkspur Ferry Terminal. Options that do not appear to conflict with any proposed or planned improvements would score higher than those that do.

Potential Implementation Problems

A potential implementation problem that may impact the overall cost and feasibility of an alignment is a very important criterion. For example, the lack of an agency to operate and maintain a drawbridge is a major unknown.

IMPORTANT CRITERIA (0-5 POINTS)

Ease of Implementation

A variety of complex issues can slow down the implementation of a project, and the fewer that exist for a project, the more likely it is to be built. They typically can include such things as environmental reviews, construction permits, the need for multiple agency support, coordination with other construction projects, or difficulty of construction due to physical location or required components. Projects that are more straightforward or do not include complex or difficult implementation or operation efforts will score higher than options that are more complex.

Privacy and Security

This is a key component for any new pathway located adjacent to private properties that may involve concerns about privacy and security. While research has shown that shared use paths do not have higher crime rates than surrounding areas, and privacy issues can usually be resolved through design, this is still a relatively important criteria. Alternatives that have potential impacts on security and privacy of adjacent land uses, especially residential areas, would score lower than other projects.

Integration into North-South Bikeway

Various alignments lend themselves more or less into a seamless integration with the County's proposed North-South Bikeway that passes through the closed Cal Park Tunnel. Other alignments, while perhaps providing direct access to the Larkspur Ferry Terminal, offer a more circuitous connection to the north-south NWP ROW alignment should the Cal Park Tunnel be re-opened.

Right-of-Way

The availability of public right-of-way is an important criterion. Alternatives that require the purchase of easements or property may involve timely and complex negotiations, plus additional

costs. These projects would score lower than projects where right-of-way ownership is already by a public agency.

Environmental Impacts

As the CMFC project will cross the Corte Madera Creek, each alignment must be assessed as to its potential significant impacts or benefits (in terms of preservation, interpretive opportunities, etc.) to the environment, including wetland impacts, visual impacts, cultural resources impacts, and noise and health impacts. Alternatives that include new construction in wetland areas or new coverage of wetlands will score lower than alternatives that have no or fewer impacts.

Aesthetics

Does the alignment contain negative aesthetic (such as proximity to a freeway) or positive aesthetic (such as access and/or views to the bay) elements that may be an important user amenity and meet Bay Trail objectives?

ALTERNATIVES AND SUB-COMPONENTS

Two major alternatives were developed, each with three sub-options. The primary alignments were defined as either (1) a multi-use path along the NWP right-of-way, or (2) a Class I multi-use path along Redwood Highway. The resulting six alternatives developed for the CMFC project are outlined below. Maps illustrating the two primary alignments are on pages 29 and 31.

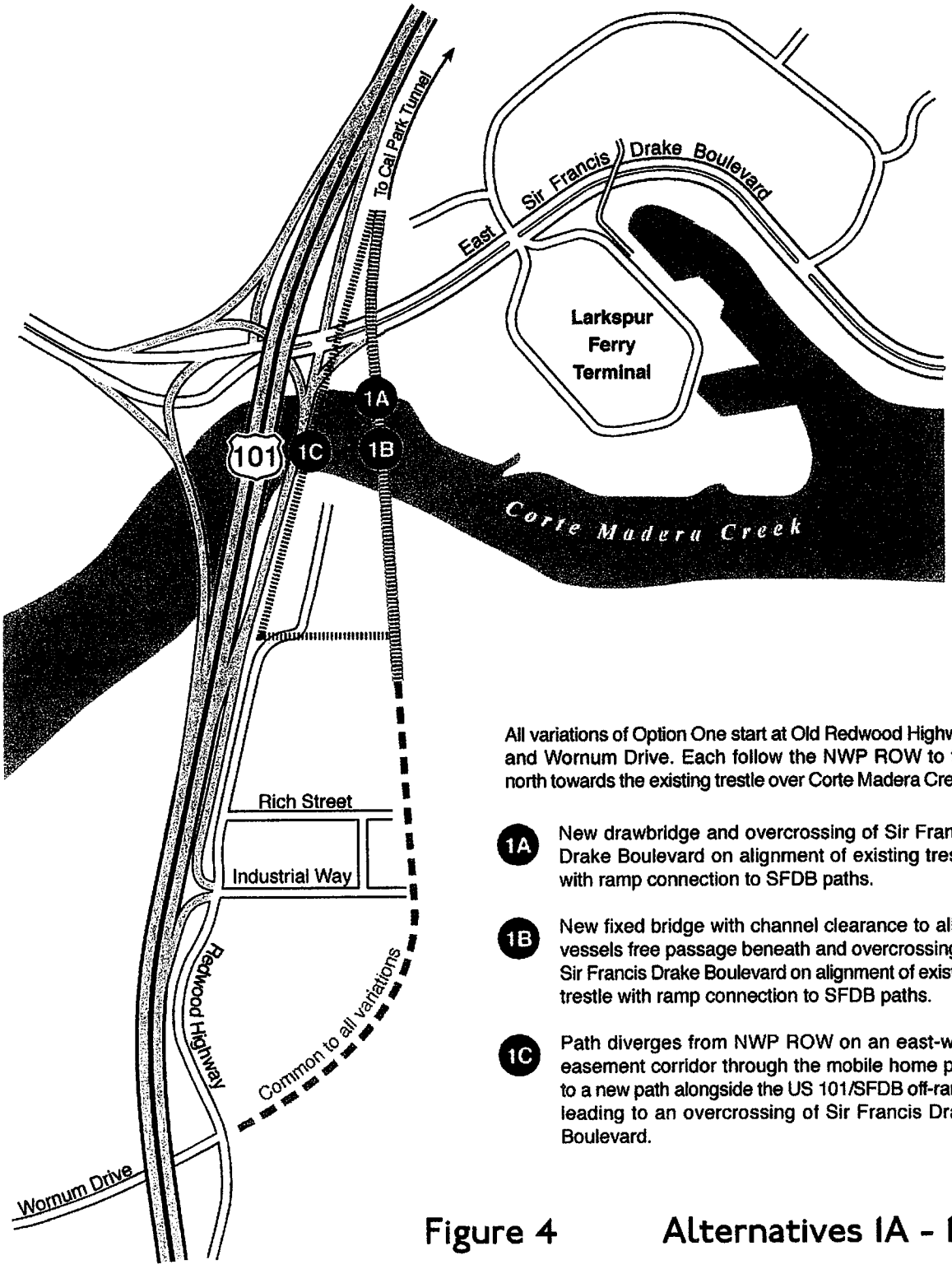
ALTERNATIVE ONE - Locate a multi-use path on the NWP right-of-way starting at Wornum Drive. (see Figure 4)

Sub-Option 1A - *NWP/Drawbridge*

- The multi-use path follows the NWP right-of-way from Wornum/Redwood Highway northward across a rehabilitated trestle and drawbridge, connecting to the south side of East Sir Francis Drake Boulevard (ESFD) on a new ramp.
- A new drawbridge would be installed at Corte Madera Creek.
- The pathway could continue across ESFD on a new bridge as part of a future connection to Cal Park Tunnel and/or Larkspur Landing.
- The multi-use path would fall entirely within the NWP right-of-way.

Sub-Option 1B - *NWP/Ramped Bridge*

- This option is similar to Sub-Option 1A but rather than using the existing trestle and drawbridge across Corte Madera Creek, the existing trestle and drawbridge would be removed and a new fixed bridge constructed within the NWP right-of-way. The bridge would provide sufficient clearance to meet Coast Guard requirements and utilize the existing concrete abutments.



All variations of Option One start at Old Redwood Highway and Wornum Drive. Each follow the NWP ROW to the north towards the existing trestle over Corte Madera Creek.

1A New drawbridge and overcrossing of Sir Francis Drake Boulevard on alignment of existing trestle with ramp connection to SFDB paths.

1B New fixed bridge with channel clearance to allow vessels free passage beneath and overcrossing of Sir Francis Drake Boulevard on alignment of existing trestle with ramp connection to SFDB paths.

1C Path diverges from NWP ROW on an east-west easement corridor through the mobile home park to a new path alongside the US 101/SFDB off-ramp, leading to an overcrossing of Sir Francis Drake Boulevard.

Figure 4 Alternatives IA - IC

Sub-Option 1C - *NWP/Off-ramp*

- The multi-use path follows the NWP right-of-way from Wornum/Redwood Highway up to a new east-west easement to be purchased from the property owner. The easement would take the pathway to the frontage road, and connect to the new U.S. 101 bridge and pathway as described below under Alternative 2. This is a hybrid option between Alternatives 1 and 2, taking advantage of the NWP right-of-way while avoiding the problems with the trestle and drawbridge. A new ramp connects the off-ramp path with the existing at-grade ESFD paths.
- On the north side of Corte Madera Creek, the path could cross over ESFD on a new bridge that meets the NWP right-of-way on the north side of the road. Although this crossing is within the scope of the CMFC project, it would most likely be constructed as part of a future connection to the Cal Park Tunnel or Larkspur Landing.

ALTERNATIVE TWO - Locate a Class1 multi-use path along the west side of Redwood Highway from Wornum Drive northward. (see Figures 5-9)

Sub-Option 2A - *Redwood Highway/Off-ramp*

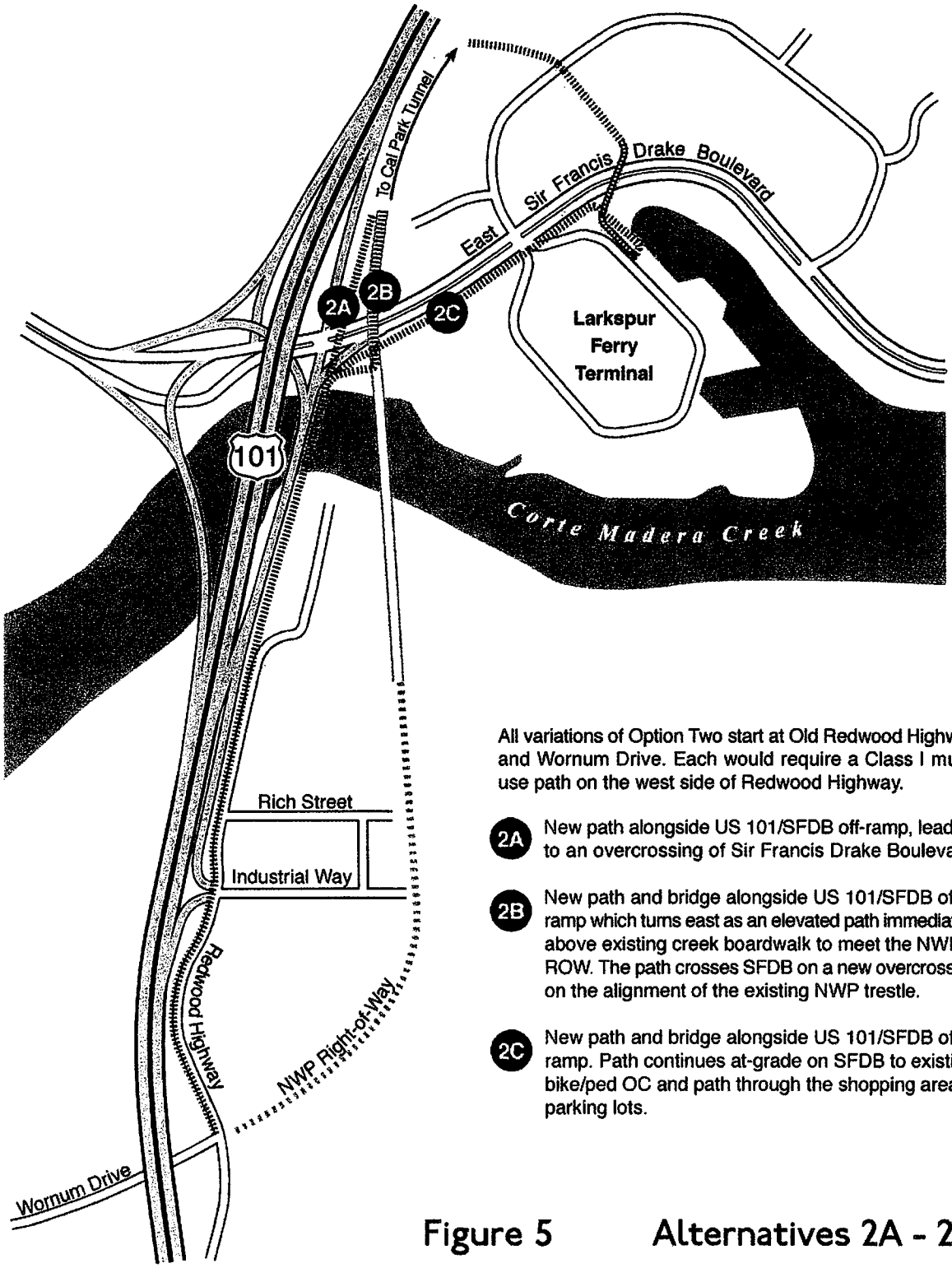
- A 10- to 12-foot wide Class I multi-use path would be installed along the west side of Redwood Highway from Wornum Drive to the existing pathway location leading onto the Corte Madera Creek U.S. 101 bridge.
- The Class I path would lead directly to a new bridge structure on the U.S. 101 ESFD off-ramp bent caps. A new ramp would connect the off-ramp path to the existing at-grade ESFD paths.
- On the north side of Corte Madera Creek, the path could cross over ESFD on a new bridge that meets the NWP right-of-way on the north side of the road. This would likely be constructed as part of a future connection to the Cal Park Tunnel or Larkspur Landing.

Sub-Option 2B - *Redwood Highway/Off-ramp/Trestle*

- This is essentially the same as Sub-Option 2A, except that a new wooden trestle would link to the existing historic trestle rather than constructing a new bridge directly from the new U.S. 101 off-ramp bridge. This elevated structure could be constructed directly over the existing boardwalk in this area. From that point the path could continue over ESFD on a new bridge to be constructed if and when the Cal Park Tunnel project moves forward or a connection to Larkspur Landing is sought.

Sub-Option 2C - *Redwood Highway/Off-ramp/No SFDB Crossing*

- This is essentially the same option as 2A and 2B except that rather than a new bridge over ESFD, users are simply directed along the south side of ESFD to the existing signals and crosswalks at Larkspur Landing Circle.



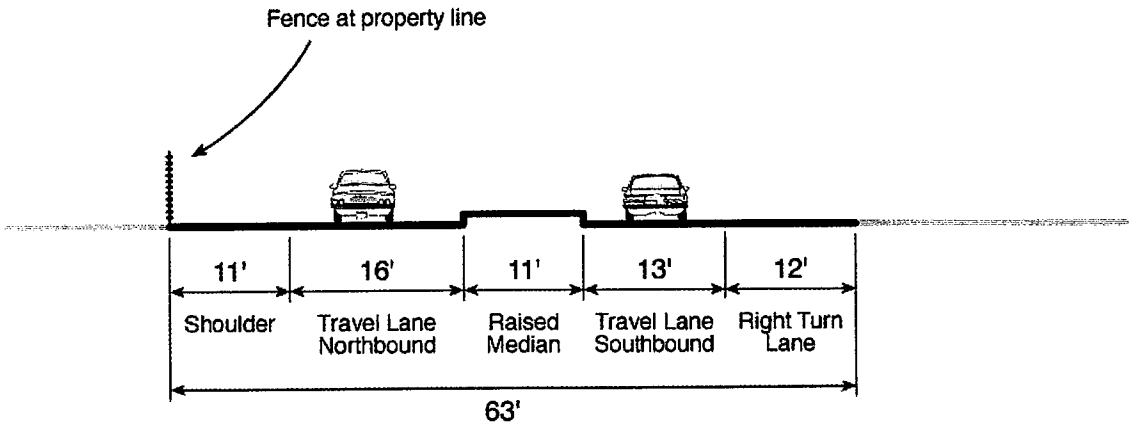
All variations of Option Two start at Old Redwood Highway and Wornum Drive. Each would require a Class I multi-use path on the west side of Redwood Highway.

- **2A** New path alongside US 101/SFDB off-ramp, leading to an overcrossing of Sir Francis Drake Boulevard.
- **2B** New path and bridge alongside US 101/SFDB off-ramp which turns east as an elevated path immediately above existing creek boardwalk to meet the NWP ROW. The path crosses SFDB on a new overcrossing on the alignment of the existing NWP trestle.
- **2C** New path and bridge alongside US 101/SFDB off-ramp. Path continues at-grade on SFDB to existing bike/ped OC and path through the shopping area parking lots.

Figure 5 Alternatives 2A - 2C

Existing Conditions:

Redwood Highway at Wornum Drive (looking south)



Proposed Class I Path on Redwood Highway at Wornum Drive (looking south)

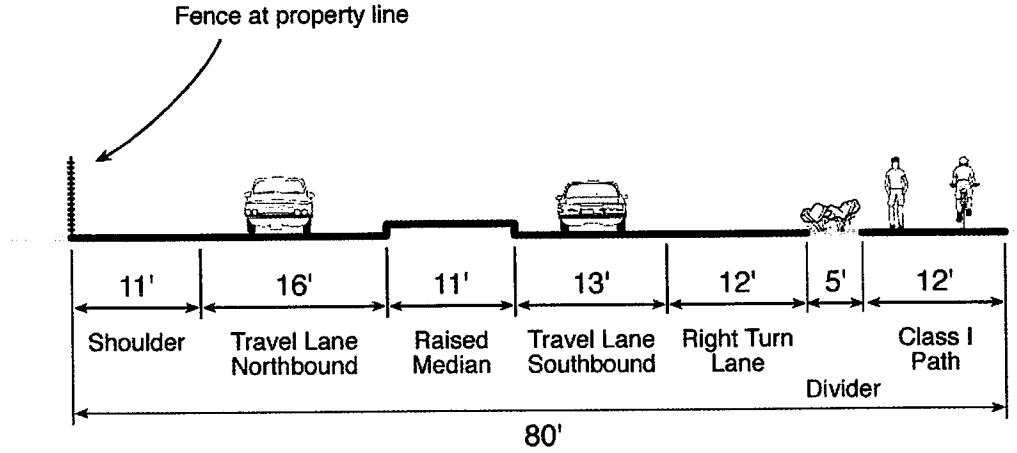
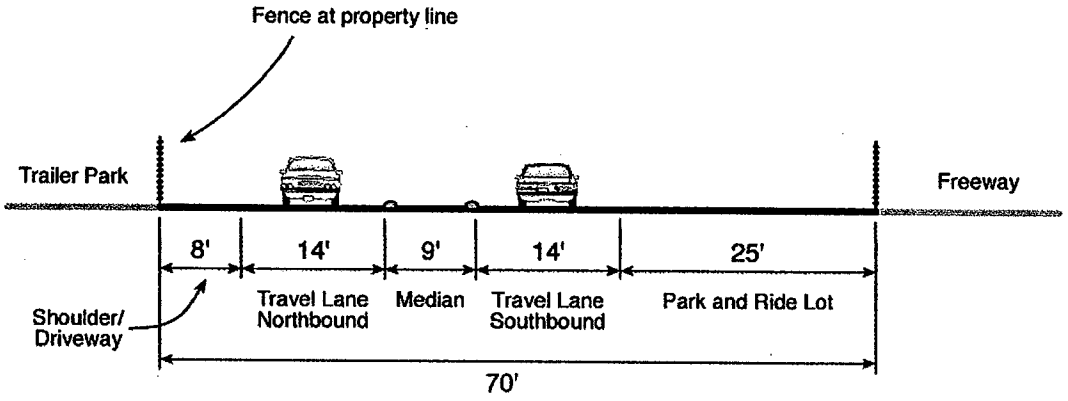


Figure 6 - Redwood at Wornum Drive Cross Sections

Existing Conditions:

Redwood Highway at Golden Gate Trailer Park Entry Drive (looking south)



Proposed Class I Path on Redwood Highway at Golden Gate Trailer Park Entry Drive (looking south)

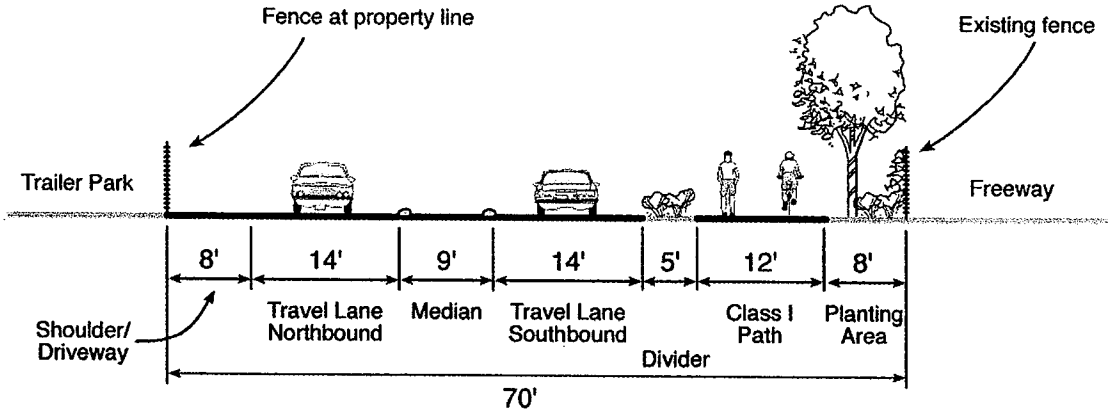
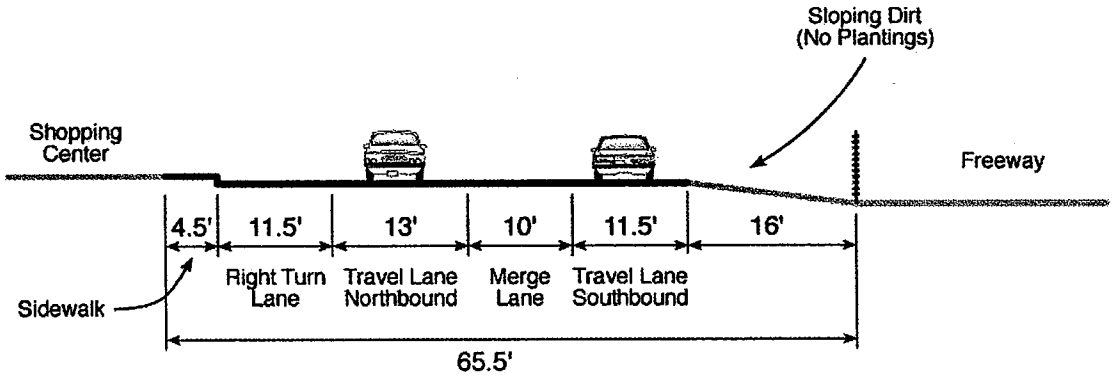


Figure 7 - Redwood at Trailer Park Cross Sections

Existing Conditions:

Redwood Highway at Marin Central Plaza Shopping Center Entry (looking south)



Proposed Class I Path on Redwood Highway at Marin Central Plaza Shopping Center Entry (looking south)

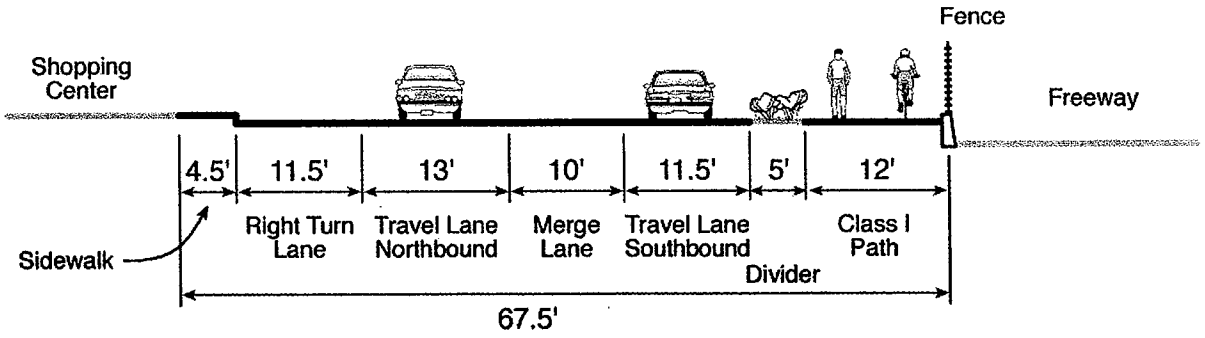
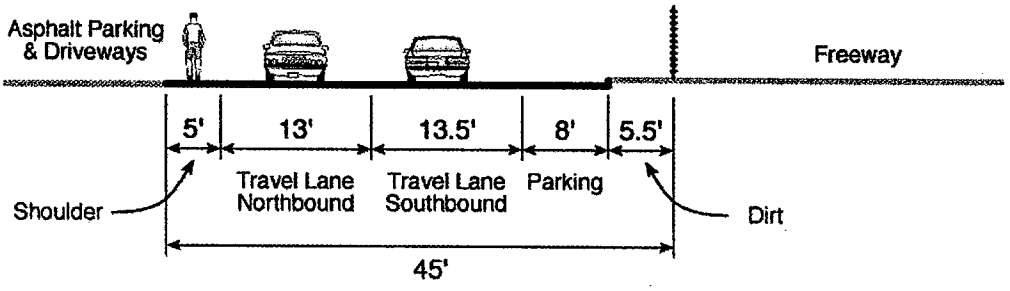


Figure 8 - Redwood at Shopping Center Cross Sections

Existing Conditions:

Redwood Highway at Rich Street (typical for north segment) (looking south)



Proposed Class I Path on Redwood Highway from Rich Street north (looking south)

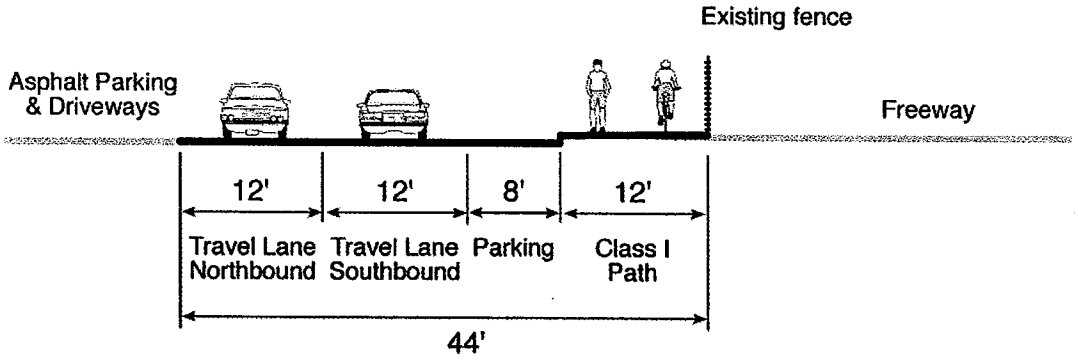


Figure 9 - Redwood at Rich Street Cross Sections

EVALUATION OF ALTERNATIVE ALIGNMENTS

This section presents an evaluation of each of the six alternatives according to the evaluation criteria previously described. Specific design and cost factors are also included for each alternative. At the conclusion of this section, a table showing how each alternative scored according to the evaluation criteria is presented.

ALTERNATIVE 1

All Alternative 1 sub-options utilize the NWP right-of-way (to some extent) on which the abandoned tracks, drawbridge, and trestle still exist. The City of Larkspur has removed a 100-foot span of the trestle immediately over ESFD. It is possible that it would be replaced by a new long span or clear span structure in the future. The new crossing must be constructed higher than the current trestle to meet Caltrans' requirement of 18' 4" minimum clearance between the road surface and bottom of the structure. The existing tracks and cross ties would be removed and a new 10-foot wide Class I paved bike path would be constructed. All sub-options include a ramp leading to the south side of ESFD with a maximum 8.3% slope

ALTERNATIVE 1A - NWP/Drawbridge

Ease of Implementation

Several essential issues influence the ability to implement this alignment. Blymyer Engineers conducted a visual inspection of the drawbridge on March 25, 2003, to determine the structural integrity of the bridge. Blymyer concluded that the drawbridge is not operable, is unsafe for public use, and that it would probably be more cost effective to demolish the existing bridge and install a new, prefabricated bridge. In addition, obtaining permits and approvals would likely make implementation difficult. Lastly, no agencies have expressed any interest in taking on the drawbridge construction, operations, and maintenance responsibilities.

Vehicle Conflicts and User Safety

Users would be completely separated from vehicles. There would be no road crossings due to the elevated nature of the path above ESFD.

Functionality / Access

The multi-use path would be continuous from end to end without any transitions from one facility type to another, except where crossing the drawbridge. It would be a direct route between Wornum Drive and the Ferry Terminal. The path would be predominantly level with a ramp of five (5) percent maximum leading down to ESFD.

Usage

The path's complete separation from motor vehicle traffic and aesthetic location near wetlands and away from the highway would attract the widest range of users.

Cost

$8.6 to $10.5 million

Compatibility with Future Transportation Plans

Alternative 4 identified in the *Interim Planning Report* prepared for the Marin CMA shows Wornum Drive being extended eastward from Redwood Highway to "provide shopping center access." It appears that a new access road could coincide with a pathway on this stretch of corridor, and it is assumed that the pathway would be designed to accommodate this future roadway. (see Figure 10)

Potential Implementation Problems

The feasibility of using a drawbridge and finding a willing agency to construct, operate, and maintain the drawbridge are critical implementation issues. Research into these items continues, however these items may represent fatal flaws to this option.

Public Support

The public expressed support for this and any option located on the NWP right-of-way at the public workshop and in surveys.

Privacy and Security

Residences at the south end near Wornum Drive would have the path immediately adjacent to their properties. The elevated section of path at the Greenbrae Boardwalk community would be immediately above residences there. New fencing and possibly landscaping could be used to screen these residences.

Integration into North-South Bikeway

The NWP right-of-way has been a key element of the County's proposed North-South Bikeway concept since the early 1970's, and is a direct connection to the proposed Cal Park Tunnel rehabilitation project. This alignment follows the exact route proposed for the North-South Bikeway.

Right-of-Way

The NWP right-of-way is anticipated to be transferred to the SMART District sometime in 2004. While SMART does not have any current plans to study any rail option south of Corte Madera Creek, they are reviewing an option leading into the Larkspur Ferry Terminal. Any multi-use path construction on the right-of-way will require SMART's acquiescence. However, the entire right-of-way is in public ownership and no new property needs to be acquired for the project.

Environmental Impacts/Cultural Resources

The construction of the multi-use path on the existing trestle structure is an unknown impact at this time. Demolishing the existing drawbridge could also present some environmental consequences.

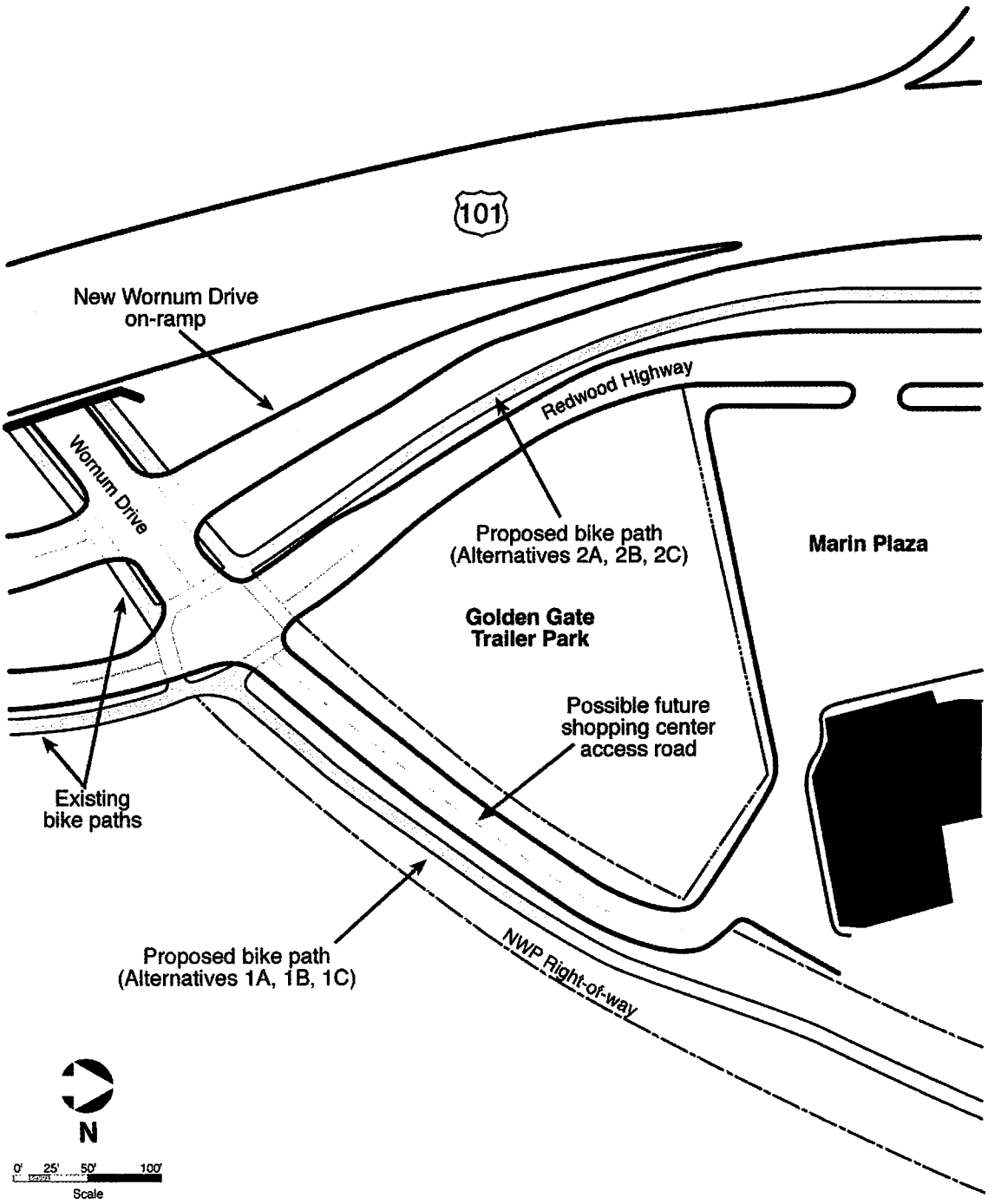


Figure 10 - Locations of the CMFC with U.S. 101 Interchange Alternative #4

Aesthetics/Noise/Health

This option offers good aesthetics for users since it is away from motor vehicles and borders on scenic wetland resources. Impacts of noise and air quality on users would be minimal. There would be minimal visual impact since this alignment would be on an existing structure.

ALTERNATIVE 1B - NWP/Ramped Bridge

Ease of Implementation

Complete removal of the existing trestle and drawbridge would be required. The construction of the new structure could be relatively straight-forward. While the construction itself would not be a constraint, the project would need to have an overall positive environmental impact to overcome permitting problems.

Vehicle Conflicts and User Safety

Users would be completely separated from vehicles and user safety would be very good.

Functionality / Access

The multi-use path would be continuous from south to north ends without any transitions from one facility type to another. It would be a direct route between Wornum Drive and the Ferry Terminal. While much of the pathway would be level, the new fixed bridge would require a vertical rise of about 15 feet at both ends. The rise could be constructed with a slope that meets ADA requirements of a maximum five (5) percent grade. A ramp would be required at ESFD to provide access to the Ferry Terminal.

Usage

The path's complete separation from motor vehicle traffic and aesthetic location near wetlands and away from the highway would attract the widest range of users.

Cost

$7.9 to $9.6 million

Compatibility with Future Transportation Plans

Alternative 4 identified in the *Interim Planning Report* prepared for the Marin CMA shows Wornum Drive being extended eastward from Redwood Highway to "provide shopping center access." It appears that a new access road could coincide with a pathway on this stretch of corridor, and it is assumed that the pathway would be designed to accommodate this future roadway. (see Figure 10 on page 38)

Potential Implementation Problems

This option has several major unknowns that may impact its overall feasibility, including environmental permitting, neighbor objections, and visual impacts. The most critical issue is that no public agency has been willing to build, maintain, or operate a new bridge. The City of Larkspur has said that they are not capable of taking on this responsibility.

Easements are required for Phase 1 within the SMART right-of-way and along the northern border of the Marin RV Park. The owners of the RV park have expressed an interest in negotiating an easement purchase with the City, but there is no guarantee that these negotiations will be successful.

Public Support

The public expressed support for this and any option located on the NWP right-of-way at the public workshop and in surveys.

Privacy and Security

Residences at the south end near Wornum Drive would have the path immediately adjacent to their properties. The elevated section of path at the Greenbrae Boardwalk community would be immediately above residences there. New fencing and possibly landscaping could be used to screen these residences.

Integration into North-South Bikeway

This alignment follows the exact route proposed for the North-South Bikeway.

Right-of-Way

The NWP right-of-way is anticipated to be transferred to the SMART District sometime in 2004. While SMART does not have any current plans to construct any rail option south of Corte Madera Creek, they are reviewing an option leading into the Larkspur Ferry Terminal. Any multi-use path construction on the right-of-way will require SMART's approval. The entire right-of-way is in public ownership and no new property needs to be acquired for the project. However, an easement will be needed from SMART and existing tenant leases on the right-of-way adjusted.

Environmental Impacts/Cultural Resources

The major concern impacting this alignment's implementation is likely objections from BCDC and ABAG that a new elevated bridge could become a potentially large environmental impact on the creek and wetlands. This option would require removal of the existing drawbridge and trestle which could have environmental impacts during construction, although removal of the old trestle and drawbridge may lessen coverage of wetland by structure and remove the creosote-soaked piles, as well.

Aesthetics/Noise/Health

This option would offer excellent aesthetic attractions to users, being located away from traffic, close to scenic bay lands, and new vistas of Corte Madera Creek. A visual impact analysis should be done to better understand the presence this structure would have on the area. Impacts of noise and air quality on users would be minimal.

ALTERNATIVE 1C - NWP/Off-ramp

Ease of Implementation

The removal of a creek crossing on the trestle eliminates both the visual impact and environmental concerns of alignments 1A and 1B. However, the purchase of an easement through private property required for the implementation of this alignment would be necessary.

Vehicle Conflicts and User Safety

Users would be mostly separated from vehicles. There would be a road crossing of Redwood Highway frontage road where the path crosses to connect between the NWP right-of-way and the bent cap multi-use path.

Functionality / Access

The multi-use path would have surface and direction transitions since it traverses the NWP right-of-way and the bent caps multi-use path. An east-west easement corridor connection located at-grade would require ADA ramps at a maximum 8.3% slope from the elevated right-of-way path on the levee to a path at-grade, as well as from the bent caps path to the at-grade path. This would be a less direct route between Wornum Drive and the ferry terminal than alignments 1A and 1B.

Usage

As a mostly separated facility, this option would be expected to attract a diversity of users although some users may be turned off by the need to cross a roadway, the somewhat circuitous routing, and the proximity to highway traffic and noise.

Cost

$7.2 to $8.7 million

Compatibility with Future Transportation Plans

Alternative 4 identified in the *Interim Planning Report* prepared for the Marin CMA shows Wornum Drive being extended eastward from Redwood Highway to "provide shopping center access." It appears that a new access road could coincide with a pathway on this stretch of corridor, and it is assumed that the pathway would be designed to accommodate this future roadway.

Alternative 4 also shows the Sir Francis Drake Boulevard eastbound off-ramp leading to ESFD as being widened to two lanes. Currently that ramp has two lanes and the left lane flares to two lanes as it approaches ESFD. It is possible that widening this ramp to two vehicle lanes may impact the feasibility of placing a pathway bridge on the bent caps. Detailed drawings were not made available from Caltrans to make this determination, and the feasibility of this alternative is based on measurements taken from aerial photos and field observations. While it appears that it would be feasible to construct a Class I path on the bent caps while allowing for future improvement to the ESFD off-ramp, the analysis of Caltrans drawings is necessary to determine of the overall feasibility and cost for this option. The geometry for a two-lane off-ramp should be evaluated during the next phase of work.

Potential Implementation Problems

The unknown impact of the proposed Greenbrae Interchange improvements presents a potential fatal flaw to this option and all others using the freeway bents to cross Corte Madera Creek. The mobile home park owners have expressed an interest in negotiating an easement purchase with the City, but there is no guarantee that these negotiations will be successful.

Public Support

The public expressed support for this and any option located on the NWP right-of-way at the public workshop and in surveys.

Privacy and Security

Residences at the south end near Wornum Drive would have the path immediately adjacent to their properties. New fencing and possibly landscaping could be used to screen these residences.

Integration into North-South Bikeway

The south portion of this alignment on the NWP right-of-way follows the exact route proposed for the North-South Bikeway. The ESFD over crossing would bring the path back to the proposed North-South Bikeway route on the north side of ESFD.

Right-of-Way

The NWP right-of-way is anticipated to be transferred to the SMART District sometime in 2004. While SMART does not have any current plans to study any rail option south of Corte Madera Creek, they are reviewing an option leading into the Larkspur Ferry Terminal. Any multi-use path construction on the right-of-way will require SMART's approval. However, the entire right-of-way is in public ownership and no new property needs to be acquired for the project.

Environmental Impacts/Cultural Resources

Environmental impacts with this alignment would be limited to the impacts of the new Class I bike path along the wetlands (if any), and the new structure located on the bent-caps of the U.S. 101 structure and across ESFD. The trestle and drawbridge would be left intact under this option.

Aesthetics/Health/Noise

The alignment will have similar positive aesthetics to Options 1A and 1B, although it will place users directly adjacent to U.S. 101 traffic for at least half of its distance. The narrow easement through the RV park would also be considered an aesthetic negative. Impacts of noise and air quality on users would be moderate to severe depending on the type of screening that could be provided along the U.S. 101 off-ramp.

ALTERNATIVE 2

All Alternative 2 sub-options utilize a Class I multi-use path on the west side of Redwood Highway from Wornum Drive north to a multi-use path leading to the U.S. 101 off-ramp

structure. The current road configuration would remain as is, and the Class I Path would be installed along available public right-of-way. All sub-options include at their north end a ramp of maximum 8.3% slope from the elevated multi-use path to the existing ESFD sidewalk.

ALTERNATIVE 2A -Redwood Highway/Off-ramp

Ease of Implementation

Moderate complications exist for the construction of this alignment, including re-construction of portions of the Redwood Highway frontage road. This option does lack the permitting, environmental, and other problems associated with other options however.

Vehicle Conflicts and User Safety

Users would be bicycling and walking on a separated Class I multi-use path parallel and adjacent to Redwood Highway for the majority of the alignment. There would be three road crossings - Wornum Drive and the Highway 101 off- and on-ramps at Industrial Way. Wornum Drive and the on-ramp are both signalized, but the Highway 101 off-ramp is stop sign controlled and could present a conflict between pathway users and vehicles. Users would be completely separated from vehicles on the bent caps multi-use path and ESFD crossing.

Functionality / Access

This option would provide a direct and relatively level connection in this corridor. It would provide good access to and from nearby land uses, the Larkspur Ferry Terminal, and the U.S. 101 pedestrian over crossing.

Usage

As a direct and separated route, this option could be expected to draw a significant number of users. However, the close proximity of the route to Redwood Highway and U.S. 101 will not be as appealing to users as a path that is completely removed from traffic.

Cost

$6.9 to $8.4 million

Compatibility with Future Transportation Plans

Alternative 4 identified in the *Interim Planning Report* shows a new interchange being constructed at Wornum Drive. This would involve the re-construction of the Redwood Highway frontage road and other major modifications. It is likely that a new Class I pathway could be provided or re-located between the future northbound on-ramp and the re-located Redwood Highway, therefore not impacting this part of Option 2A.

Alternative 4 also shows the Sir Francis Drake Boulevard off-ramp leading to ESFD as being widened to two lanes. Currently that ramp has one lane that flares to two lanes as it reaches ESFD. It is possible that widening this ramp to two vehicle lanes may impact the feasibility of placing a pathway bridge on the bent caps, impacting the overall feasibility and cost of this option. No detailed drawings are available at this time to make that determination. (see Figure 10 on page 38)

Potential Implementation Problems

The major potential implementation unknowns of this and other options located on Redwood Highway are the unknown impacts of the proposed U.S. 101 Interchange improvements, especially as they might impact a Class I bike path along Redwood Highway and on the Corte Madera Creek bridge.

Public Support

While most members of the public expressed support for options located on the NWP right-of-way at the public workshop and in surveys, some people did support any option that could be implemented as quickly and efficiently as possible.

Privacy and Security

There are no private property impacts with this alignment.

Integration into North-South Bikeway

This alignment is parallel to the North-South Bikeway proposal that utilizes the NWP right-of-way. The ESFD overcrossing would connect the path to the proposed North-South Bikeway route on the north side of ESFD.

Right-of-Way

There are no right-of-way constraints with this alignment, although permits will be required from Caltrans.

Environmental Impacts/Cultural Resources

There are no significant environmental impacts with this alignment. The trestle and drawbridge would be left intact.

Aesthetics/Health/Noise

The aesthetics for users on this option would be relatively poor, since users would be riding or walking directly between a highway and a frontage road. Health and noise impacts would likely be moderate to severe as well, depending on the type and effectiveness of screening.

ALTERNATIVE 2B - Redwood Highway/Off-ramp/Trestle

Impacts of this option would be almost exactly the same as for Option 1A. Minor variations are related to the type and location of a new bridge over ESFD. While Alternative 2A has a more direct but longer structure, Alternative 2B connects from U.S. 101 over to the existing trestle and from there over ESFD. This new trestle will have higher environmental impacts than 2a (since it is located in a wetlands, but over the existing boardwalk), but lower visual impacts since it is a shorter and more compatible-looking wood structure.

Cost

$6.7 to $8.2 million

ALTERNATIVE 2C - Redwood Highway/Off-ramp/No SFDB Crossing

Only criteria that differ from Alternatives 2A and 2B are discussed below.

Ease of Implementation

Similar to Options 2A and 2B, except that the elimination of an ESFD crossing would simplify this option even further.

Vehicle Conflicts and User Safety

Similar to Options 2A and 2B, except that any user desiring to go to Larkspur Landing or, in the future, connect to Cal Park Tunnel would need to cross busy ESFD at the Ferry Terminal entrance. In Larkspur Landing, bicyclists and pedestrians would need to navigate through parking lots before reaching Larkspur Landing Circle for an on-street portion of the route.

Functionality / Access

This option offers the same functionality as Options 2A and 2B, except for users headed for Larkspur Landing or the future Cal Park Tunnel, in which case they would need to follow a circuitous route. Access to the Larkspur Ferry Terminal would be good.

Usage

This option would have a similar usage level as Options 2A and 2B except for users who might be headed for Larkspur Landing or the future Cal Park Tunnel.

Cost

$4.3 to $5.3 million

Integration into North-South Bikeway

This option would offer poor integration into a future North-South Bikeway since it does not offer a direct connection to the Cal Park Tunnel and a grade-separated crossing is located away from the path of travel near the Ferry Terminal entrance.

ALTERNATIVES ANALYSIS

Each alignment was numerically ranked according to the criteria described previously, as shown in the following table. At this preliminary level of analysis, the table is kept relatively simple to clarify the strengths and liabilities of each alternative.

Alternative 1B scored the highest due to the complete separation from motor vehicle traffic, functionality, directness, maximum usage potential, aesthetics, and public support. Alternative 1A also scored well because of the same characteristics as 1B, but implementation complications prevented it from outscoring 1B. Alternatives 2A, 2B, and 2C scored lowest due to the combination of a less-than-desirable environment to walk or bicycle (due to the proximity to U.S. 101), and/or the cost.

Table 4
Alignment Evaluations

	1A	1B	1C	2A	2B	2C
Most Important Criteria (0-10)						
Vehicle Conflicts / User Safety	10	10	8	3	3	3
Functionality / Access	10	10	7	9	9	7
Usage	10	10	7	3	3	2
Cost	2	3	3	4	5	10
Compatibility with Plans	10	10	10	5	6	5
Potential Implementation Problems	0	4	8	8	7	10
Important Criteria (0-5)						
Ease of Implementation	0	3	4	4	4	4
Public Support	5	5	3	2	2	1
Privacy / Security	1	1	1	5	5	5
North-South Bikeway	5	5	3	3	3	0
Right-of-Way	1	1	1	5	3	5
Environmental / Wetland Impacts	4	3	5	5	4	5
Cultural Resources	5	1	5	5	5	5
Noise / Health	5	5	3	0	0	0
Aesthetics / Visual Impacts	5	2	3	0	2	2
TOTALS	**73**	**74**	**71**	**61**	**61**	**64**

Numeric Rankings

Most Important Criteria
- 0 Strong Negative Impact / Low Benefit / High Cost
- 5 Neutral Impact / Benefit / Average Cost
- 10 Low Negative Impact / High Benefit / Low Cost

Important Criteria
- 0 Strong Negative Impact / Low Benefit / High Cost
- 3 Neutral Impact / Benefit / Average Cost
- 5 Low Negative Impact / High Benefit / Low Cost

PREFERRED ALIGNMENTS

The Technical Advisory Committee reviewed and discussed the results of this screening process with the result that three preferred alignments (1A, 1B, and 1C) were identified for more in-depth analysis. Alternative 1A was determined to have several significant problems. This includes inherent problems with operating a drawbridge and the condition of the drawbridge itself. Due to these and other problems, Alternative 1A was dropped from consideration.

ALTERNATIVE 1B: NWP/Ramped Bridge

This option has been identified as a preferred option by members of the public and the advisory committee for several reasons, including: (1) it is direct, (2) it is removed from traffic and noise,

and (3) it is close to the Bay and wetlands. This section describes how Alternative 1B could be developed and the potential types of solutions to address these concerns.

Alternative 1B would begin on the NWP right-of-way at the intersection of Redwood Highway and Wornum Drive. It would require construction of a 10-foot wide Class I asphalt multi-use path on the centerline of the right-of-way, or, if a new roadway is developed connecting to Marin Central Plaza as part of the Wornum Drive interchange project, the pathway would be located next to this access road (see Figure 10). The path would follow the right-of-way on property owned by the Town of Corte Madera and SMART to the existing railroad trestle. Solid privacy fencing would be required at the Marin RV Park east property line.

Existing Tenants

SMART/GGBHTD currently lease much of the Northwestern Pacific Railroad right-of-way at the end of Industrial Way. Existing tenants include Rich Readimix Concrete, Marin Park Inc., and Pierre Josephs & Associates. While there is public access to the Ecological Reserve in this area via Industrial Way, some of the existing users are not compatible with a public amenity. As part of this project, some existing leases may need to be modified and possibly terminated to allow for the pathway. Given that the path will greatly enhance public access to this area, it may be desirable to improve conditions including landscaping and removal of equipment storage facilities.

Demolish Trestle and Drawbridge

In order for Option 1B to be implemented, the trestles leading up to the drawbridge and the drawbridge itself would need to be demolished. The trestles were constructed by the Northwestern Pacific Railroad in 1923. Structural engineers have determined that, while the existing piers could be rehabilitated, they could not be used to support a new high-level bridge. Removing the drawbridge and trestles and replacing them with a new structure is recommended to construct a high-quality bridge that meets the approval of neighbors, accommodates the anticipated demand for this pathway, and is soundly designed. In the long run, demolishing the corroding drawbridge and deteriorating trestle would be a positive environmental action.

Bridge Design

A new high-level bridge would be constructed parallel to the existing trestle footprint to allow for a future SMART rail line. A low-maintenance concrete pier structure would be the most cost-effective type of bridge that would also impose relatively low environmental impacts. (see Figure 11)

East Sir Francis Drake Boulevard Crossing

Alternative 1B could be developed in three phases, with Phase I located within the NWP right-of-way beginning at Wornum Drive and continuing through an easement in the Marin RV Park (for short-term access across Corte Madera Creek until a new bridge is built), Phase II terminating at ESFD, and Phase III spanning ESFD and connecting to Larkspur Landing and Cal Park Tunnel. In either case, a new ADA-accessible ramp will need to be constructed from the bridge to the south side of ESFD (see Figure 12). In Phase III, a new 170-foot long ESFD crossing would be of either steel or concrete, and be constructed with approximate 85-foot spans

with a center pier, or a 170-foot span without a center pier. The pathway would need to ramp up slightly here to allow for greater vertical clearance under the bridge. At the northern terminus of the ESFD crossing, an asphalt multi-use path would extend 1,100 feet along the NWP right-of-way to the Larkspur Landing Theaters parking lot.

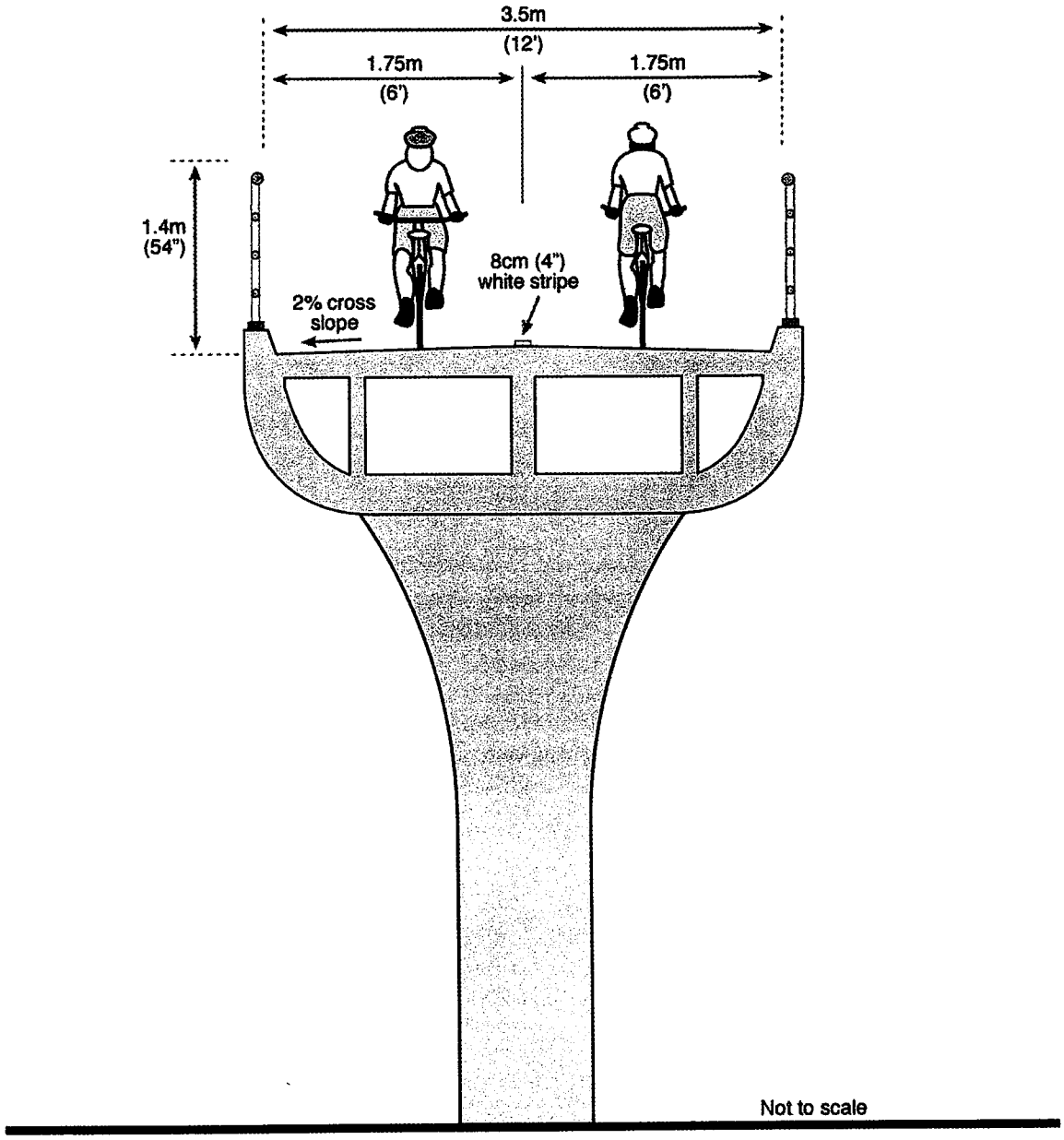


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Figure 11 - New Bridge Across Corte Madera Creek

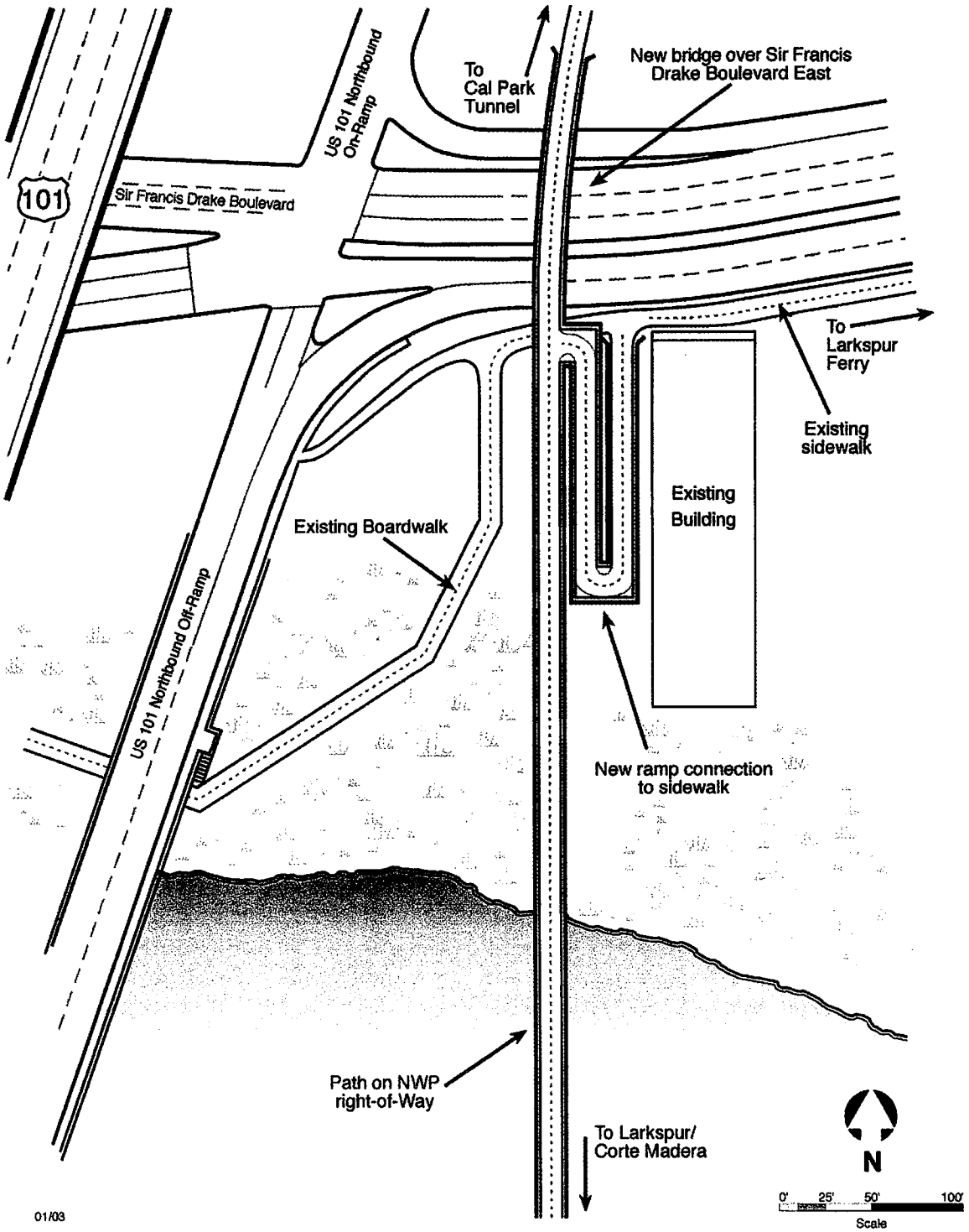


Figure 12 - Ramps on Alignment 1B

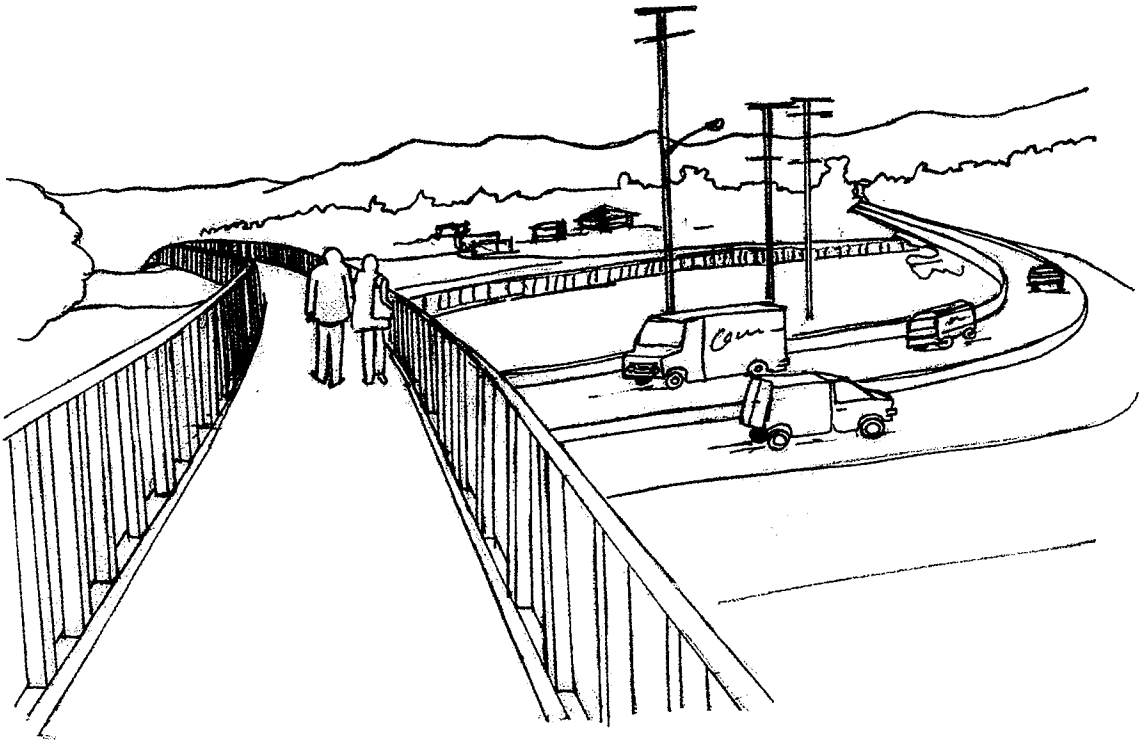


Figure 13 - Multi-Use Path on Trestle Sketch

ALTERNATIVE 1C: NWP Right-of-Way and Bent Caps Creek Crossing

This option has been identified as the preferred option if option 1B is determined to be not feasible in the future. The positive qualities of this option include: (1) it is relatively level, (2), it can be constructed with limited environmental impact, (3), it would impose minimal visual obstruction to the Bay and wetlands, (4) it is partially removed from traffic and noise, and (5) it is close to the Bay and wetlands along part of its route. This section describes how Option 1C could be developed and potential solutions to address its easement requirement.

NWP Right-of-Way

This alternative would be the same as Alternative 1A, beginning on the NWP right-of-way at the intersection of Redwood Highway and Wornum Drive. The path would follow the right-of-way to approximately the north end of the Marin RV Park community property. Solid privacy fencing would be required at the Marin RV Park east property line. It would also require relocating or removing the current tenant(s) on the NWP right-of-way.

Easement

An east-west connection between the NWP right-of-way segment and the U.S. 101 Corte Madera Creek crossing segment could occur through the Marin RV Park property within a 15-foot wide minimum easement. The easement would accommodate a 10-foot wide Class 1 asphalt multi-use path, two-foot shoulders, and perimeter fencing. As the right-of-way is higher than the Marin RV Park property, a ramped path of maximum 8.3% slope would be required to transition the path to grade level within the easement. The easement path would terminate at Redwood Highway and a crossing of the road would be necessary to connect the easement path to the U.S. 101 pathway crossing (same as Alternatives 2A – 2C).

The easement could be placed along the north edge of the Marin RV Park property, creating a corridor along the north property line. The easement location would require reconfiguring some of the RV community's parking and road alignments to accommodate the path. Locked gates along the easement fencing may be required for Marin RV Park resident access (see Figure 14).

To cross Redwood Highway at the RV community's north property line, a crosswalk would be installed to connect the path with a 10-foot wide Class I path on the west side of the road. The path would be set back from the road by five feet and would be interrupted by a private property driveway on its way to the creek crossing path.

The path leading from Redwood Highway frontage Road to the new U.S. 101 pathway bridge located on the bent caps would be reconstructed as a 10-foot wide Class I asphalt path parallel to the existing fence. The path would require a ramp at its north end to meet the creek crossing structure; a maximum 8.3% slope would be maintained to allow ADA access on the ramp.

If an easement is not possible feasible, Industrial Way could function as the east-west connection between the Redwood Highway and the NWP right-of-way segments of the alignment. Industrial Way would require sidewalk construction and bike lane striping to clearly define the bicycle and pedestrian facilities. Sidewalks on Redwood Highway from Industrial Way north would require moving the existing perpendicular parking along the east side of the road. The lower traffic volume on this section of the road could allow road striping of a bicycle and pedestrian zone, although this may not be considered an adequate replacement for a raised curb and sidewalk.

Easement Purchase

The purchase of an easement typically requires the landowner to agree to grant an easement for a trail (minimum 15-20 feet wide) in exchange for zoning changes that ensure the development potential of the parcel is not impacted. Alternatively, a corridor may need to be purchased outright in order to preserve it for trail use. Purchase of the corridor would, of course, be a more expensive option for the City.

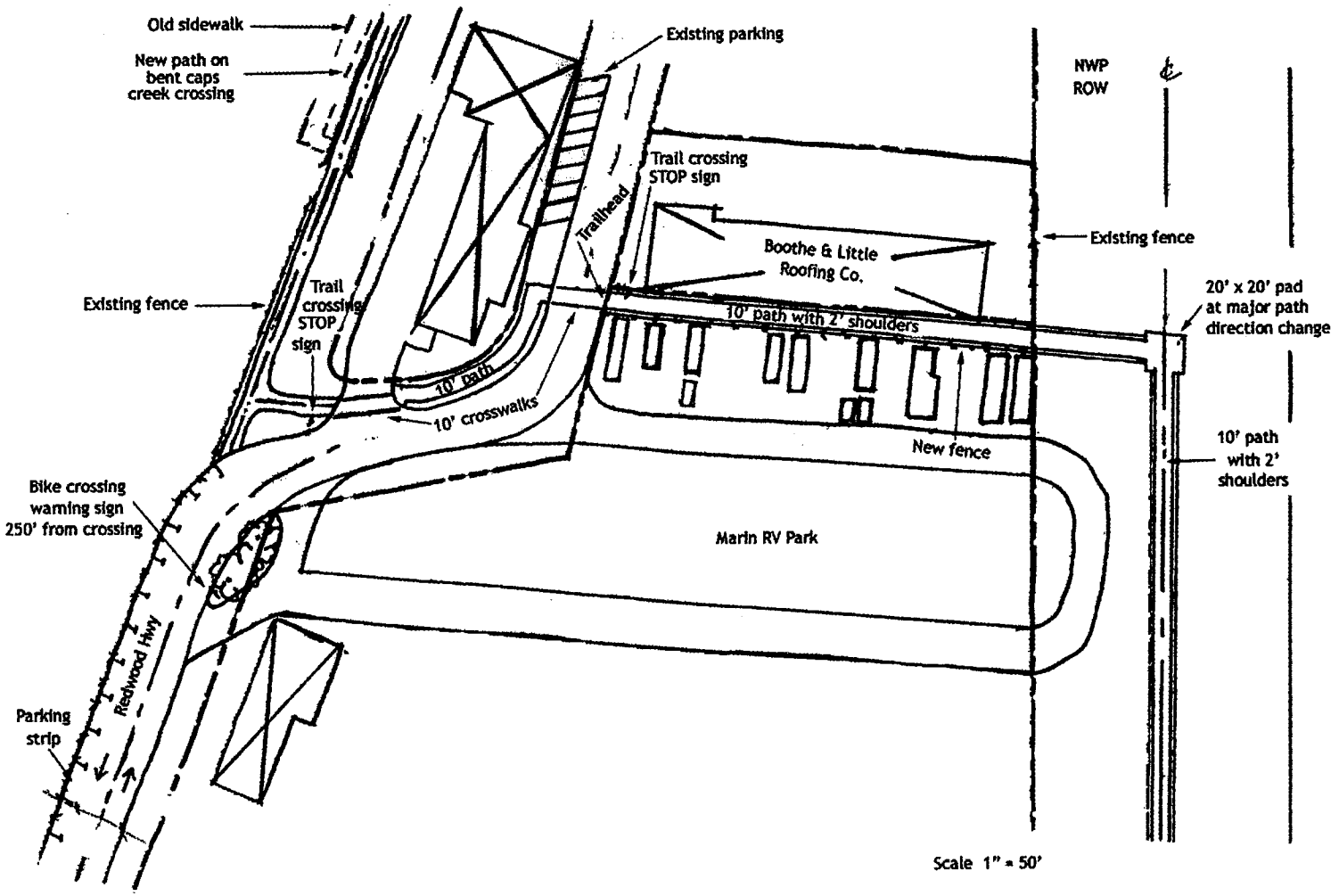


Figure 14 - Multi-Use Path on Easement

The City would need to have local approvals in place to pursue the purchase, and may option the property in the expectation it can find the needed funding. During the option process, the City will need to (a) negotiate an acceptable purchase price and (b) seek funding. In order to identify an acceptable price, the City may wish to use a "friendly condemnation" process whereby a neutral third party is enlisted to determine the fair market value. A preliminary appraisal estimated the easement value at $200,000.

Bent Caps Creek Crossing

Structural engineers have recommended the use of pre-cast, pre-stressed concrete girders on top of the Highway 101 off-ramp bent caps to support a 10-foot wide concrete multi-use path (see Figure 16). The bents are spaced at 80 feet on-center and extend out beyond the east side of the road above the creek. Both the north and south approaches to the multi-use path structure would meet at grade with ramps as necessary, with slopes not to exceed 8.3% with appropriate resting areas, or five percent maximum as a continuous grade.

The design of the Class I path on the ESFD off-ramp bent caps would be configured such that enough room is left to accommodate potential future improvements to the off-ramp by Caltrans. Potential improvements include widening the off-ramp to include standard shoulders (eight feet and two feet) as well as the possible addition of a second eastbound lane as recommended in the Interim Planning Report prepared for the Marin CMA. Therefore, the path would be installed as a separate structure from the ESFD off-ramp, sharing only the bent caps.

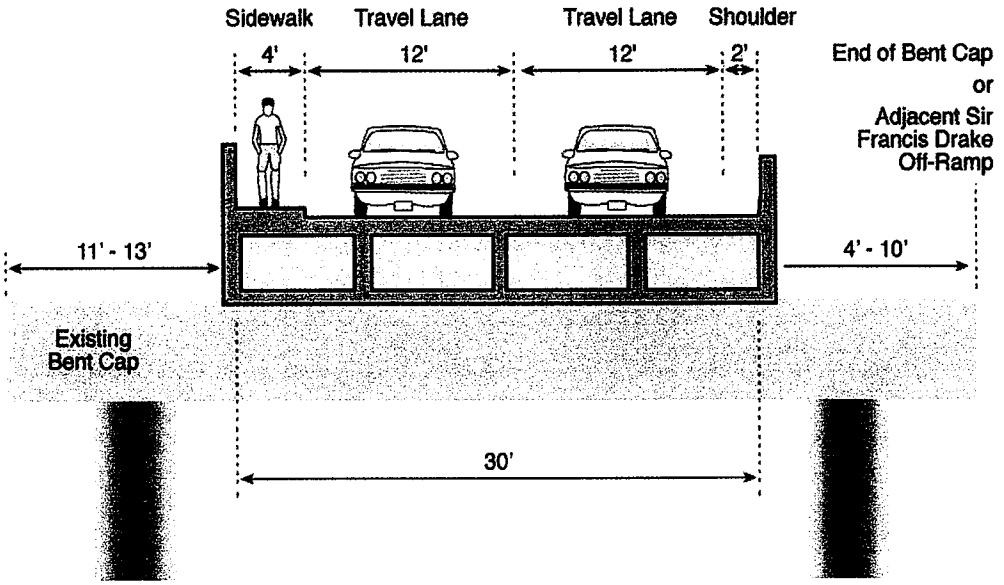
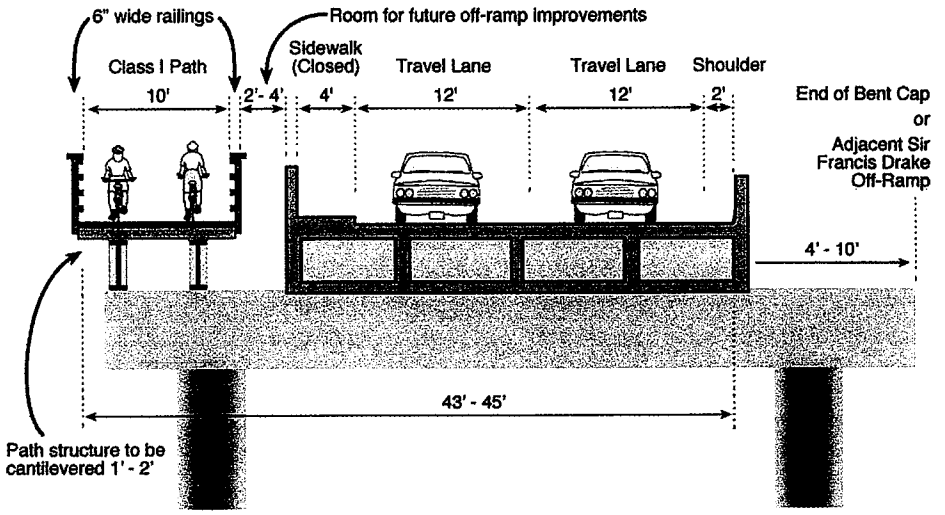


Figure 15 - Existing Conditions: US 101 / East Sir Francis Drake Northbound Off-Ramp (looking south)

The proposed short-term configuration for the Class I path installation would space the path structure two to four feet from the western edge of the off-ramp on the bent cap, allowing room for future Caltrans improvements. As a result, the path would be cantilevered one to two feet from the western edge of the bent cap. This short-term configuration assumes no modifications will be made to the ESFD off-ramp including the removal of the existing pedestrian sidewalk, though access to the sidewalk may be restricted. The proposed long-term configuration would include the Class I path as installed as well as Caltrans off-ramp improvements (see Figure 16).

Proposed Short Term Configuration:
Class I Path on Existing Bent Caps
(looking south)



Proposed Long Term Configuration:
Proposed Class I Path with East Sir Francis Drake Northbound Off-Ramp Improvements
(looking south)

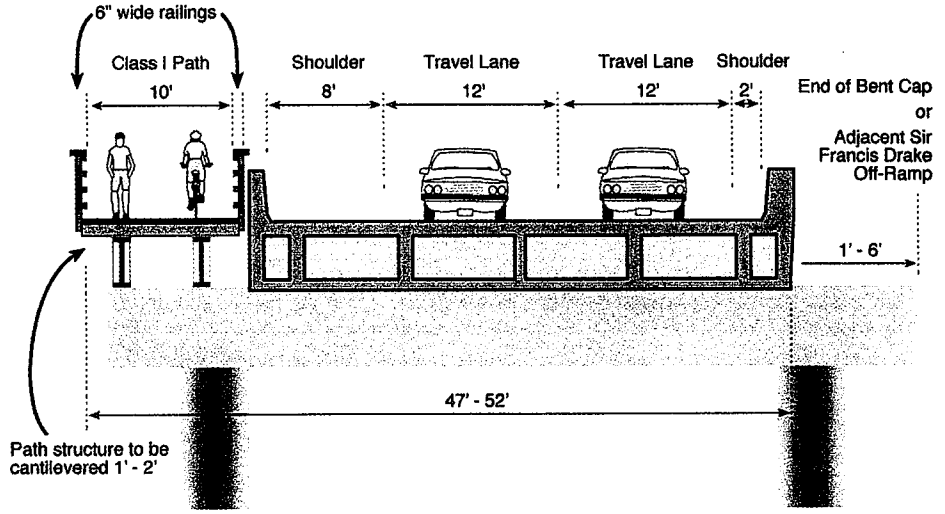


Figure 16 - Proposed Pathway Configurations on Bent Caps

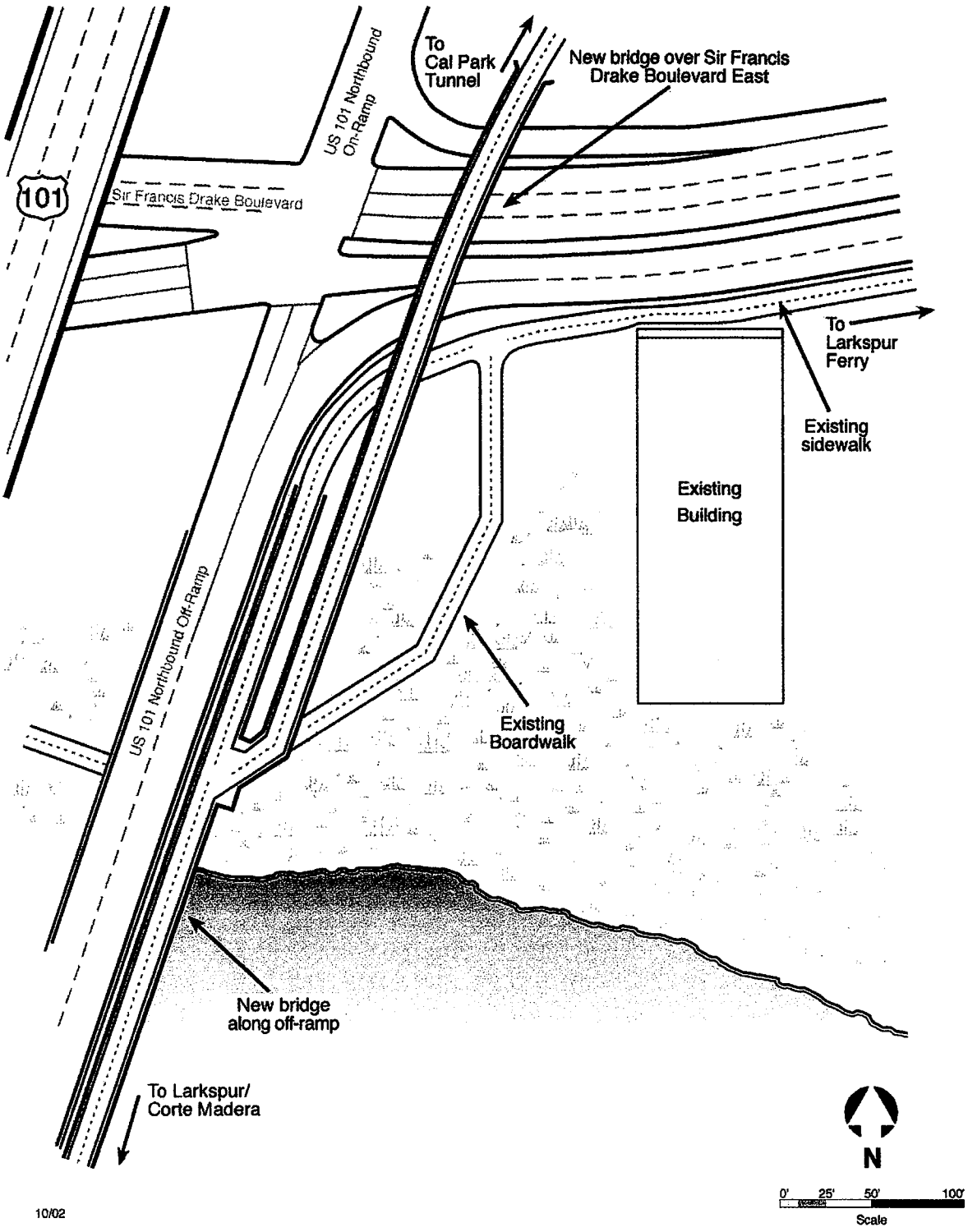


Figure 17 - Ramps on Alignments 1C & 2A

East Sir Francis Drake Boulevard Crossing

The elevated 10-foot wide multi-use path crossing of Sir Francis Drake Boulevard would begin at the north end of the U.S. 101 bent caps crossing structure, directly above where the existing boardwalk crosses under the off-ramp (see Figure 17). Existing stairs at this location would allow pedestrian access to the boardwalk below. This elevated crossing would total 450 feet from the bent caps structure to the northern terminus of the ESFD crossing.

ELEMENTS COMMON TO BOTH ALTERNATIVES

Maintenance and Operations

The issue of maintenance responsibilities for the structures is common to both Alternatives 1B and 1C. The feasibility project itself is a joint effort by four agencies (City of Larkspur, Town of Corte Madera, County of Marin, Golden Gate Bridge District), and the project involves numerous jurisdictions in its short length.

Most of the proposed structures lie within the jurisdiction of the County of Marin, with a small portion on the north side of Corte Madera Creek being in the City of Larkspur. Golden Gate Bridge District/SMART own the NWP right-of-way and have requested that any trail option be designed so as not to preclude future rail across Corte Madera Creek.

There are two basic types of responsibilities that would need to be apportioned on either crossing alternative: (a) short-term or day-to-day maintenance and operations, and (b) long-term maintenance and liability. Each is addressed separately below.

Short Term

Short-term responsibilities generally include activities such as:

- Ranger or police patrols and emergency response
- Daily and weekly maintenance such as inspections, trash removal, and graffiti removal
- Monthly and seasonal maintenance such as weed abatement and repairing signs
- Annual and bi-annual maintenance such as re-paving and re-striping, cleaning drainpipes, and pavement sweeping
- As needed actions such as fallen trees, pothole repair, or other hazardous conditions

In most areas, a parks and recreation department will perform these tasks since they are already equipped and experienced for these types of jobs.

Long Term

Long-term responsibilities generally include:

- Major re-construction or expansion
- Capital replacement
- Liability

In most areas, these responsibilities fall with either local public works or parks and recreation departments. It is not clear whether the new responsibilities would include the pathway components to the south of the new bridge.

Potential Costs

Annual operating and maintenance costs for shared use paths average about $10,000 per mile for facilities with no landscaping. Structures generally require no additional costs unless they have on-going problems such as flooding or vandalism. Given that capital moneys are easier to find than maintenance moneys, most shared use path structures are built so as to minimize maintenance costs.

The estimated annual maintenance costs for proposed structures in Alternatives 1B and 1C of the Central Marin Ferry Connection project, assuming that a new bridge would be constructed to modern standards, ranges between $12,000 and $15,000 per year.

Long-term costs are difficult to assess, since the path and structure are likely to have a very long life span with little annual maintenance. For example, Caltrans maintenance of the nearby U.S. 101 pedestrian overcrossing receives very little, if any, annual maintenance to the structure itself other than occasional inspections and graffiti removal. Liability costs are not likely to increase since local agencies are already self-insured, although there would be an increase in liability exposure. The structural material (wood, steel, or concrete) may be a large factor in minimizing long-term liability and maintenance costs.

Potential Lead Agencies

There are several possible lead agencies to take over the operations and maintenance for the Central Marin Ferry Connection bridge.

1. **Individual Agency** - Each individual agency could operate and maintain their section of the pathway to some agreed-upon, consistent standard.
2. **County Parks** - County Parks & Open Space currently operates bike paths in Marin County, including the future Cal Park Tunnel pathway. They could assume day-to-day responsibility for the path, with each local agency taking on long-term responsibility for their segment.
3. **County Public Works Department** – This department already operates and maintains bridges and roadways in Marin, and is probably the most experienced in the long-term maintenance of this type of structure.

4. **Joint Powers Authority (JPA) or MOU** - Each of the local agencies could join a JPA or sign a MOU agreeing to contribute a specific annual amount towards annual maintenance - possibly contracted out to County Parks - and to share long-term responsibilities.
5. **SMART** - Since SMART owns the right-of-way for Alternative 1B, local agencies could turn over maintenance to SMART and contribute an annual amount towards maintenance. This would give SMART more control over the pathway that may be adjacent to its rail operations.

ANALYSIS OF PREFERRED ALTERNATIVES

The advantages and disadvantages of Alternatives 1B and 1C have been reviewed in detail. It is clear that both alternatives would provide a major improvement to bicyclists and pedestrians in Central Marin County, but Alternative 1B more closely meets the goals and objectives of the Technical Advisory Committee (TAC). Alternative 1B scores the highest based on the criteria discussed previously, but there are six major obstacles that need to be overcome:

1. Finding an agency willing to take on the construction, operation, and maintenance of a new high-level bridge
2. Compatibility with future SMART plans
3. Controversy surrounding loss of trestle and drawbridge
4. Environmental impacts to the wetlands during construction
5. Visual impacts from a high level bridge
6. Easement acquisition through the mobile home park.

Alternative 1C contains many of the advantages of Alternative 1B, but is not as direct. Safety issues would be minimal since a single traffic conflict would occur at the un-signalized crossing of Redwood Highway on its northern section where low traffic volumes exist. The Class I path in the NWP right-of-way and the new bent cap structure could be completed with minimal environmental impact. However, potential fatal flaws for this alignment include potential conflicts with future Corte Madera Creek U.S. 101 widening, the need for Caltrans approvals, and the need to acquire the easement through the mobile home park. Construction of the option's segments (NWP right-of-way path, easement path, bent caps creek crossing, and the ESFD crossing) could be built in phases. Costs to reconfigure Redwood Highway between Wornum Drive and Industrial Way could be added to the new path construction costs, so both routes could be upgraded at the same time.

RECOMMENDATION

Based on the analysis in this report and input from the four participating agencies and the TAC, the following recommendations are made:

1. **Proceed with Phase I.** Continue planning, design, and implementation of the Phase I segment of the project, which is a new Class I pathway on the NWP right-of-way from Wornum/Redwood Highway to the Marin RV Park, and from that point to a new easement on the perimeter of the RV Park to Redwood Highway. This effort includes obtaining a new easement on the perimeter of the Marin RV Park, and possibly modifying or removing some existing tenants on the NWP right-of-way at the end of Industrial Way to allow for a pathway. This would provide a new Bay Trail segment, and enhance access to the existing sidewalk on the U.S. 101 Corte Madera Creek overcrossing. Note: If Phase I and the Phase II creek crossing are constructed at the same time, the need to acquire the easement through the Marin RV Park should be re-evaluated.
2. **Seek Policy Guidance.** The decision to proceed with Alternative 1B is a policy decision among the four member agencies participating on this project. Staff from each of the agencies should provide their recommendations in a Staff Report, supported by the TAC recommendations. Each of the alternatives has significantly different costs, advantages, and disadvantages. Policy guidance is required as to the feasibility and desirability to take on new maintenance responsibilities for a major new structure over Corte Madera Creek.
3. **Identify an Implementation Agency.** The funding application and MOU for the project states that Marin County will take the lead in implementing this project. The MOU states: "The City of Larkspur will request that the Marin County Congestion Management Agency consider assuming responsibility for subsequent projects to complete the work initiated by this grant, as the Congestion Management Agency generally coordinates multi-jurisdictional projects." The partners on this project need to resolve the issue of who will lead the implementation phase.
4. **Proceed with Planning and Design.** Continue working with Caltrans and other agencies in the development of plans and designs for Alternative 1B. Work with the four partner agencies to ensure good connectivity southward into Corte Madera, and northward linking to the Cal Park Tunnel project.

DESIGN AND IMPLEMENTATION

This chapter addresses the implementation of the Central Marin Ferry Connector project (CMFC). Once the preferred alternative identified in this report is officially accepted by the implementing agencies, actual implementation of the project can begin. This chapter reviews those steps along with details on costs, design standards, and other items.

NEXT STEPS

Selection of the preferred alternative is the first implementation step. This report identifies Alternative 1B as the preferred alternative. The list below summarizes the next steps for this project.

1. **Project Approval:** The implementing agency (the City of Larkspur) needs to formally accept this report and the preferred alternative, in a hearing open to the public.

2. **Project Sponsor:** The implementing agency, if different than the City of Larkspur, needs to take responsibility for the next steps.

3. **Environmental Review:** An environmental analysis needs to be conducted per CEQA requirements. It is likely that a Mitigated Negative Declaration (MND) can be used for Alternative 1B, rather than a full EIR. The public will have several opportunities to review and comment on the project and potential impacts in this process.

4. **Funding:** The implementing agency can pursue full implementation funding for the project, starting immediately.

5. **Easement Acquisition:** The easement acquisition process can be initiated.

6. **Design:** The design process, currently at about 30% completion, can proceed at the same time the environmental work is being completed. Next steps include title searches, surveying, review of "as-built" drawings, and soil borings. A contract for full design and engineering services could be let out once the environmental process indicates there are no fatal environmental flaws. The easement acquisition process can be initiated when a decision about the project phasing has been made since an easement may not be necessary if Phases I and II are constructed at the same time.

7. **Permitting:** Permit approvals from BCDC, Corps of Engineers, U.S. Coast Guard, and other entities can be completed.

PHASING

The ability to construct a project in phases can be an important element because it may allow for agency location of funds over time, rather than all at once. Grant allocations are dispensed annually, but without guarantee of repeat receipt by any one applicant; each year an agency may have to apply for a mixture of different grants. Having the flexibility to hold off construction of less critical project elements until funding is secured is a significant advantage for the sponsoring agency.

The Central Marin Ferry Connection will be built in three phases. Phase I will consist of the southern portion of the project from Wornum Drive within the NWP right-of-way, and through an easement in the Marin RV Park. This will provide access to the existing Corte Madera Creek crossing until a new bridge can be constructed in Phase II. Phase III is the future East Sir Francis Drake Boulevard crossing to link this project to Larkspur Landing and the Cal Park Tunnel pathway. Potential phasing increments of Alternative 1B are shown below.

1. Completion of Feasibility Study
2. Preliminary Design
3. Phase I (Southern Section): Final design, environmental, permitting, easement purchase
4. Phase II (Creek Crossing): Final design, environmental, permitting, final PS&E
5. Construction of Phase I (Southern Segment)
6. Construction of Phase II (Creek Crossing)
7. Planning/Design/Permitting for Phase III (East Sir Francis Drake Boulevard)
8. Construction of Phase III

COST ESTIMATE

Cost estimates have been developed to reflect the proposed alignment and alternatives envisioned in this report. Because the estimates have been developed without the benefit of specific design drawings, they are to be considered preliminary and subject to change.

Table 5 provides a detailed breakdown of the three key construction phases consistent for all alignments. The south end of the CFMC project up to the Corte Madera Creek crossings is shown first. Costs range from $337,500 for the pathway within the NWP right-of-way to $491,460 for the alignment along Redwood Highway.

The three crossing-types of Corte Madera Creek are shown in the second section. Type #1 is the rehabilitation of the existing trestle and building a new drawbridge in Alternative 1A, with a cost of $3.4 million. Type #2 is a new high-level bridge constructed along the NWP ROW and demolition to the existing trestle/drawbridge with a cost of $3.6 million. Type #3 is a new

bridge constructed on the bent caps of the U.S. 101 over crossing, with a cost of about $2.1 million. All options include a new ramp connecting to the south side of ESFD.

The three basic crossing types of ESFD are shown next. Alternatives 1A and 1B simply cross on a new bridge replacing the existing trestle. Alternatives 1C and 2A cross on a new 450 feet long bridge from the U.S. 101 over crossing in a direct line to the north side of ESFD. Alternative 2B connects from U.S. 101 over to the existing trestle above the existing boardwalk, and from there is similar to Alternatives 1A and 1B. Finally, Alternative 2C has no new bridge; it simply routes users to the existing signalized intersection at Larkspur Landing Circle.

Operating and maintenance costs are shown for a 20-year period. Maintenance costs for the pathway sections are estimated at $10,000/mile, while the trestle maintenance is about 60% higher than the maintenance figures for the new construction. Drawbridge costs are added as identified earlier in this report. Annual maintenance costs for the CFMC project are estimated to run between $23,000 and $78,000.

The total capital and operating costs for the alternatives ranges from $5.3 million for Alternative 2C to $10.5 million for Alternative 1A. The preferred alternative, 1B, has a total cost of about $9.6 million.

Table 5
Alignment Capital Costs

	Alignment Option	Length	1A	1B	1C	2A	2B	2C
	Section	(feet)						
1	WORNUM / REDWOOD HWY TO							
	CORTE MADERA CREEK CROSSING							
	Wornum/Redwood Hwy Crossing Improvements		$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
	Class I Bike Path-NWP ROW							
	To RV Park Easement / Trestle	2,500	$332,500	$332,500	$332,500			
	New Easement/Path	320	$292,560	$292,560	$292,560			
	Class I Bike Path-Redwood Hwy	2,300				$305,900	$305,900	$305,900
	Roadway Improvements	800				$80,000	$80,000	$80,000
	Roadway Crossing Improvements				$5,000	$10,000	$10,000	$10,000
	Class I from Frontage Rd to US 101	320			$42,560	$42,560	$42,560	$42,560
	New Sidewalks on Redwood Hwy	400				$48,000	$48,000	$48,000
	Sub-Total		$630,060	$630,060	$677,620	$491,460	$491,460	$491,460
2	CORTE MADERA CREEK CROSSING							
	RehabTrestle-South Side/North Side	900	$2,226,000					
	Replace Drawbridge	60	$850,000					
	New Ramp to ESFDB	240	$340,000	$340,000				
	Demo Existing Trestle/Drawbridge	960		$250,000				
	New High Level Structure	960		$3,010,180				
	Bikeway Bridge on US 101 Overcrossing	870			$2,114,045	$2,114,045	$2,114,045	$2,114,045
	Sub-Total		$3,416,000	$3,600,180	$2,114,045	$2,114,045	$2,114,045	$2,114,045
	Construction Total		**$4,046,060**	**$4,230,240**	**$2,791,665**	**$2,605,505**	**$2,605,505**	**$2,605,505**
	Project Cost Factors (incl. contingencies/inflation, planning, design, permitting, etc)		$2,549,018	$2,665,051	$1,758,749	$1,641,468	$1,641,468	$1,641,468
	TOTAL (Without ESFD Crossing)		**$6,595,078**	**$6,895,291**	**$4,550,414**	**$4,246,973**	**$4,246,973**	**$4,246,973**
	Low		**$5,935,570**	**$6,205,762**	**$4,095,373**	**$3,822,276**	**$3,822,276**	**$3,822,276**
	High		**$7,254,586**	**$7,584,820**	**$5,005,455**	**$4,671,670**	**$4,671,670**	**$4,671,670**
3	ESFD Crossing							
	ESFD Replacement Bridge	170	$850,000	$850,000			$850,000	
	New Direct Bridge from US 101 over ESFD	450			$1,797,600	$1,797,600		
	New Trestle from US 101 to Existing Trestle	300					$821,400	
	Improved Class I on South Side of ESFD	1,100						$38,500
	Construction Total		**$850,000**	**$850,000**	**$1,797,600**	**$1,797,600**	**$1,671,400**	**$38,500**
	Project Cost Factors (incl. contingencies/inflation,		$535,500	$535,500	$1,132,488	$1,132,488	$1,052,982	$24,255
	TOTAL (With ESFD Crossing)		**$7,980,578**	**$8,280,791**	**$7,480,502**	**$7,177,061**	**$6,971,355**	**$4,309,728**
	Low		**$7,182,520**	**$7,452,712**	**$6,732,452**	**$6,459,355**	**$6,274,220**	**$3,878,755**
	High		**$8,778,636**	**$9,108,870**	**$8,228,552**	**$7,894,767**	**$7,668,491**	**$4,740,701**
	20-YEAR OPERATION & MAINTENANCE ESTIMATES							
	Pathway Maintenance		$190,152	$190,152	$190,152	$190,152	$190,152	$190,152
	Structure Maintenance		$573,000	$274,000	$274,000	$274,000	$274,000	$274,000
	Drawbridge Operation		$800,000	$0	$0	$0	$0	$0
	20-YEAR TOTAL		**$1,563,152**	**$464,152**	**$464,152**	**$464,152**	**$464,152**	**$464,152**
	Annually		$78,158	$23,208	$23,208	$23,208	$23,208	$23,208
	TOTAL COMBINED O&M AND CAPITAL COSTS							
	TOTAL (With ESFD Crossing)		**$9,543,729**	**$8,744,943**	**$7,944,653**	**$7,641,213**	**$7,435,507**	**$4,773,880**
	Low		**$8,589,356**	**$7,870,448**	**$7,150,188**	**$6,877,091**	**$6,691,956**	**$4,296,492**
	High		**$10,498,102**	**$9,619,437**	**$8,739,119**	**$8,405,334**	**$8,179,057**	**$5,251,268**

RECOMMENDED PLANNING AND DESIGN STANDARDS

This section provides specific design and implementation guidelines and standards to ensure that the preferred CMFC project is constructed to a consistent set of the highest and best standards currently available in the United States. Planning, design, and implementation standards are derived from the following sources:

- Caltrans: Highway Design Manual (Chapter 1000: Bikeway Planning and Design)
- Americans with Disabilities Act (ADA)
- AASHTO: A Policy on Geometric Design of Highways and Streets
- Manual of Uniform Traffic Control Devices
- USDOT/FHWA: Conflicts on Multiple-Use Paths
- ITE: Design and Safety of Pedestrian Facilities

The California Department of Transportation (Caltrans) has developed specific design guidelines in the Highway Design Manual for Class I multi-use paths. Off-road portions of the CMFC path will be designed to Class I standards wherever possible. These standards are intended to be a guide to engineers in their exercise of sound judgment in the design of projects. Design standards should meet or exceed the Caltrans standards to the maximum extent feasible. Lower standards may be used "when such use best satisfies the concerns of a given situation." Mandatory design standards "are those considered most essential to achievement of overall design objectives. Many pertain to requirements of law or regulations such as those embodied in the FHWA's controlling criteria." Mandatory standards are identified in Chapter 1000 of the Highway Design Manual with the use of bold text and the word "shall".

Advisory standards are important but allow for greater flexibility and are both underlined and identified by the word "should." Permissive standards are identified by the words "should" or "may" and can be applied at the discretion of the project engineer. Controlling Criteria, as defined by the FHWA, consists of 13 specific criteria to be used in the selection of design standards. They are: (1) design speed, (2) lane width, (3) shoulder width, (4) bridge width, (5) horizontal alignment, (6) vertical alignment, (7) grade, (8) stopping sight distance, (9) cross slope, (10) super elevation, (11) horizontal clearance, (12) vertical clearance, and (13) bridge structural capacity.

Except for the Caltrans guidelines, all design guidelines must be considered as simply design resources for the CMFC project, to be supplemented by the reasonable judgment of professionals. The following sections establish the basic design parameters as developed by Caltrans. Mandatory standards are shown in bold face.

PATH WIDTH

The recommended minimum width for paved multi-use paths, according to the California Highway Design Manual, is eight feet, with two feet of lateral clearance and

eight feet of vertical clearance (see Figure 18). If the path is projected to have higher volumes of bicyclists and others, or if maintenance vehicles will be using the path on a regular basis, a minimum width of 10 feet is recommended with the same lateral and vertical clearances. The CMFC project is recommended to be 10 feet wide with two-foot wide unpaved shoulders made of a compacted surface (often decomposed granite) wherever possible. The shoulders are located on each side of the paved surface to accommodate joggers and others who prefer a softer surface. Alignment 1C's portions on the Corte Madera Creek bent caps structure and the ESFD crossing structure would be 10 feet wide. A two percent cross slope for drainage should be provided on all path segments.

INTERSECTIONS AND CROSSINGS

Phase I of Alignments 1B and 1C has one road crossing of Redwood Highway at its northern end where traffic volumes are low. In general, crossings should occur at established pedestrian crossings wherever possible, or at locations completely out of the influence of intersections. Path approaches at intersections should always have Stop or Yield signs to minimize conflicts with autos. Crossing signs may be placed in advance of path crossings to alert motorists. Ramps should be placed on sidewalk curbs for bicyclists and to meet ADA requirements.

DESIGN SPEED

According to the California Highway Design Manual, the minimum design speed for multi-use paths is 20 miles per hour, except on sections where there are long downgrades (steeper than four percent, and longer than 500-feet). **Speed bumps or other surface irregularities should never be used to slow bicycles.**

HORIZONTAL ALIGNMENT

Recommended curve radii and super elevations should conform to Caltrans *Highway Design Manual* Chapter 1000 specifications, along with recommended stopping distances.

STRUCTURAL SECTION - PATH CONSTRUCTION AND OVERCROSSINGS

Multi-use path construction should be conducted in a similar manner as roadway construction, with sub-base thickness to be determined by soils condition and expansive soil types requiring special structural sections. Minimum asphalt thickness should be two inches of Type A or Type B as described by Caltrans Standard Specifications, with a six-inch thick Class 2 aggregate base. In areas on the path where there is expected to have regular use by patrol or maintenance vehicles, the preferred pathway material for the path is a four-inch reinforced concrete material with sub-base or six inches of reinforced concrete on compacted native material (if suitable). In other areas where these conditions do not exist, three-inch thick asphalt concrete may be suitable.

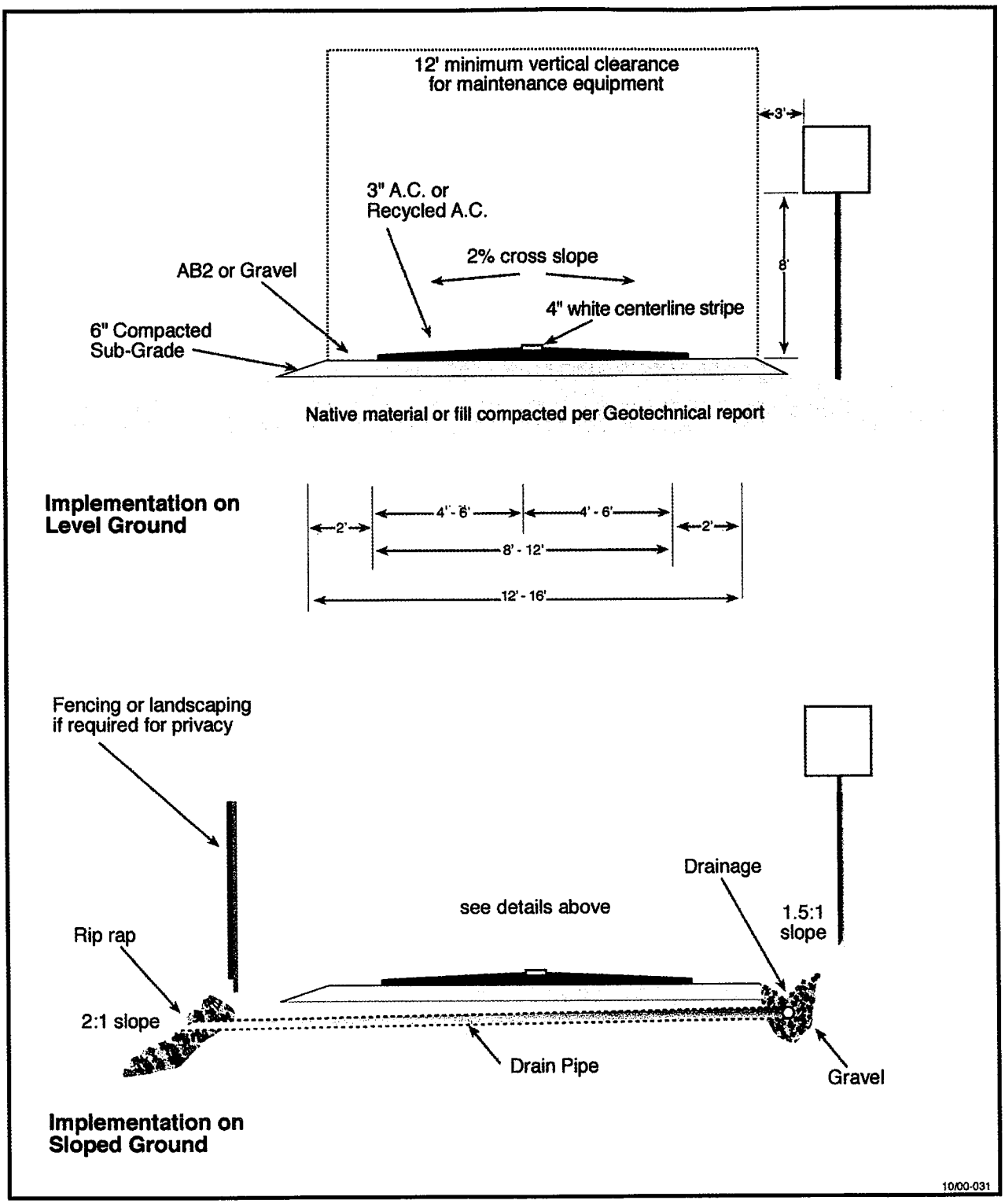


Figure 18 - Multi-Use Path Cross Section

The creek and ESFD overcrossings are proposed to be cast-in-place pre-stressed concrete box girder construction. This has proven to be the most cost effective and efficient method of building this type of structure in Northern California. The path element of these structures will consist of six-inch reinforced concrete. The previous Figure 12 illustrates the bent caps creek crossing structure, while Figure 19 illustrates the road overcrossing. The overcrossing would be constructed of 60-foot spans to clear ESFD with a center pier. The overcrossings will conform to Caltrans' standard design loading of 85 pounds per square foot.

A dual sound barrier and protective screen will be required between the bent caps structure and the freeway off-ramp. Structure railings on the bent caps creek crossing and ESFD overcrossing should be designed for both pedestrian and bicycle use.

DRAINAGE

Drainage is expected to be a minor issue for all portions of the path, except for the area near the Marin RV Park. The project designer and City of Larkspur should work closely together to ensure that adequate drainage is provided and the impacts of flooding minimized. Drainage inlet grates, if required, will have openings narrow enough and short enough to insure that bicycle tires will not drop into the grates. A minimum two percent cross slope is recommended for adequate drainage of the path on all sections.

BARRIER POSTS

Posts at path intersections and entrances (such as the Wornum Drive entry and the Redwood Highway crossing) may be necessary to keep vehicles from entering. Posts should be designed to be visible to bicyclists and others, especially at night, with reflective materials and appropriate striping. Posts should be designed to be easily moveable by emergency vehicles, such as bollards or a half gate and bollard. See Figures 20 and 21.

SIGNING, MARKINGS, AND TRAFFIC CONTROL DEVICES

Uniform signs, markings, and traffic control devices shall be used per section 2376 of the Streets and Highways Code.

Multi-use path signing and markings should follow the guidelines as developed by Caltrans and the Manual on Uniform Traffic Control Devices. This includes advisory, warning, directional, and informational signs for bicyclists, pedestrians, and motorists. The final striping, marking, and signing plan for the CMFC path should be reviewed and approved by a licensed traffic engineer or civil engineer.

Designs which deviate from the mandatory Caltrans design standards **shall** be approved by the Chief, Office of Project Planning and Design, or to delegated Project Development Coordinators. These standards represent the basic guidelines set forth by Caltrans. There are many conditions that are not explicitly covered in the Caltrans or AASHTO guidelines.

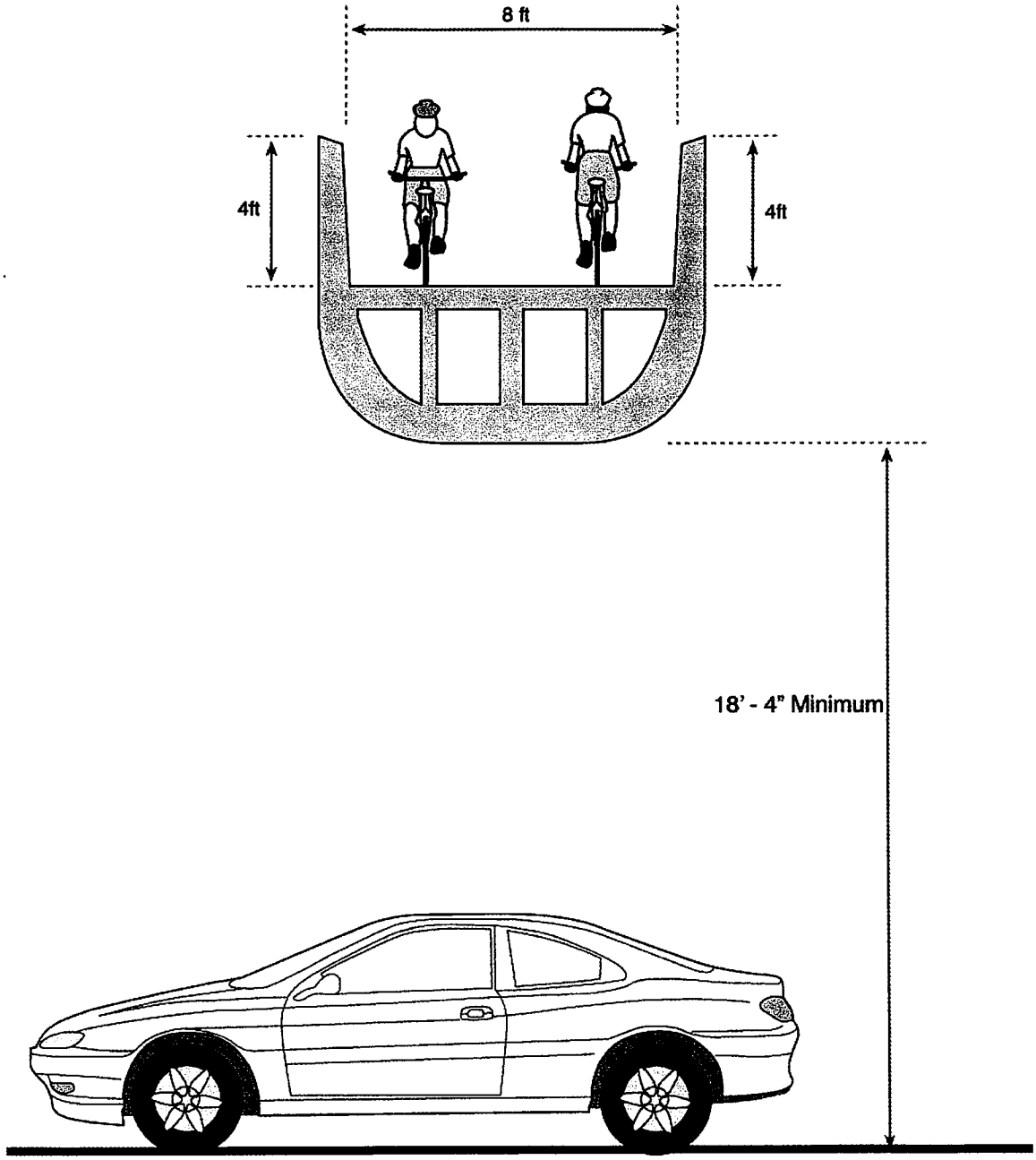


Figure 19 - Concrete Overcrossing Structure

Collapsible bollards are appropriate at trail locations where access control is important but regular entry is anticipated by maintenance, law enforcement, or emergency services vehicles. The bollards can be quickly folded to ground level, providing sufficient clearance for even low vehicles. Current models are operable with a simple wrench/key device. Collapsible bollards can be substituted for fixed bollards at any trail location.

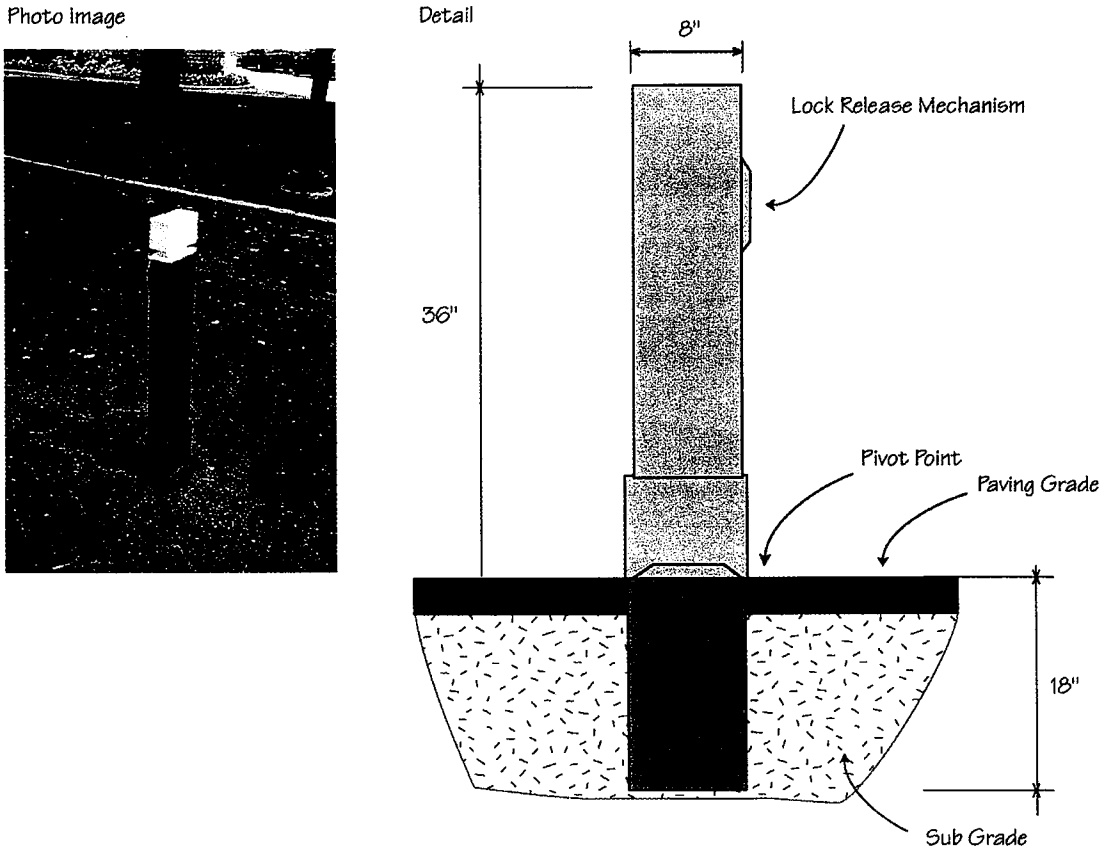


Figure 20 - Collapsible Bollard

Fixed bollards are utilized at trailheads, neighborhood access points and trail intersections where vehicular access to the trail is prohibited. Bollards can be very helpful in urban and suburban areas for keeping unwanted vehicles off of highly used trails, thereby preserving the safety of its users. In rural locations where there is easy access to trails from adjacent lands, bollards may not serve a meaningful purpose.

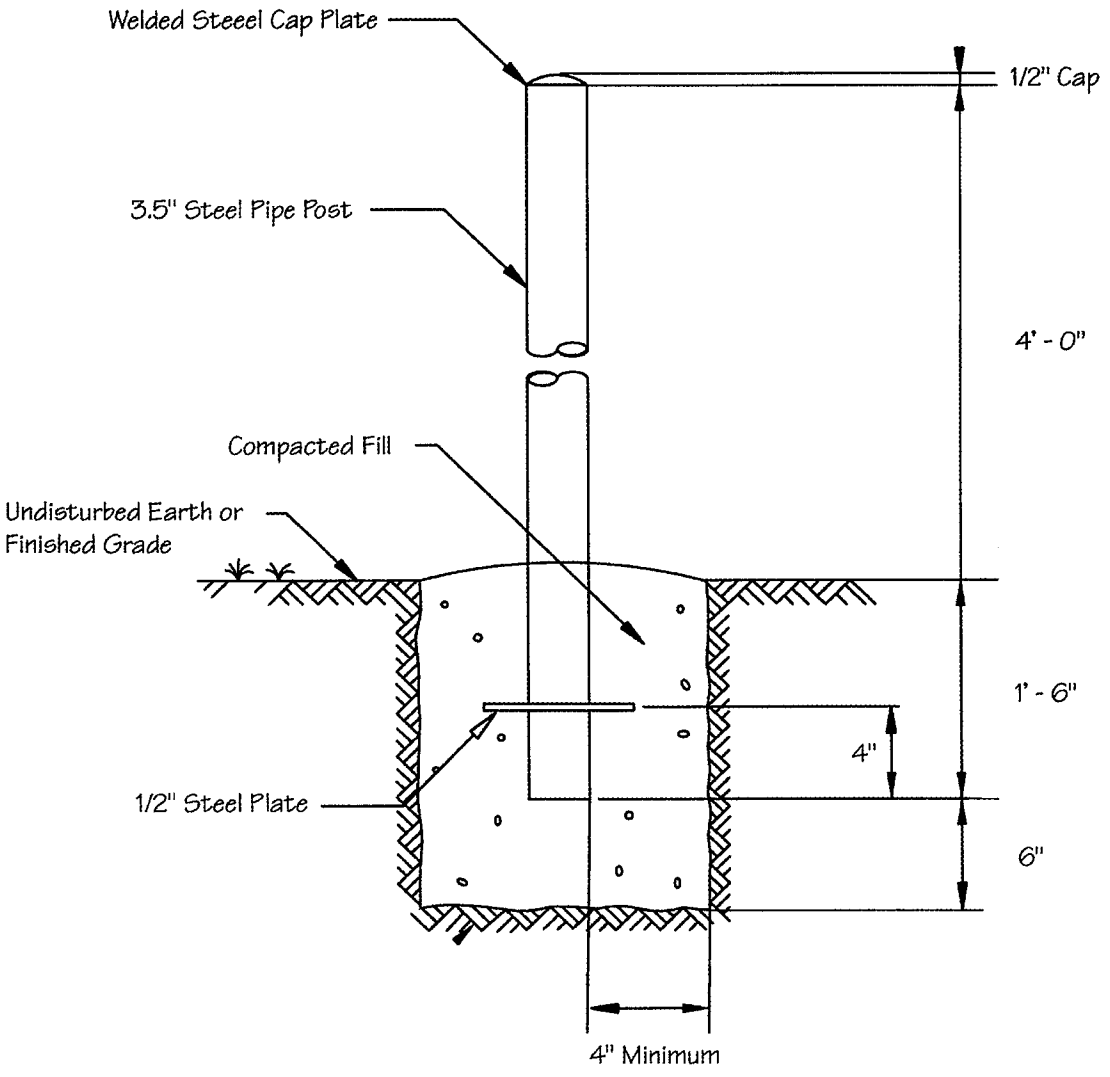


Figure 21 - Fixed Bollard

In general, all signs should be located two to four feet from the edge of the paved surface, have a minimum vertical clearance of 8.5 feet when located above the path surface and be a minimum of four feet above the path surface when located on the side of the path. All signs should be oriented so as not to confuse motorists. The designs (though not the size) of signs and markings should be the same as used for motor vehicles.

FENCING AND BARRIERS

Fencing and other barriers are typically used to separate a path from adjacent private property and land uses. The NWP right-of-way is currently open to public access from all directions. For the path to be constructed along the right-of-way starting at Wornum Drive, private property trespassing and wetland preservation concerns may require fencing to be installed on one or both sides of the path. The east-west easement corridor of alignment 1C would also require fencing as a barrier between the path and the adjacent private property. A variety of fencing materials are available, as shown in Figure 22. The following are important considerations when selecting fencing or barriers:

Aesthetics: Depending on the type and height of the barrier, the aesthetics of a path could be impacted by eliminating or reducing views and visibility, and otherwise creating a "bowling alley" effect for users. Fencing materials should also contribute - rather than detract - to the overall community aesthetics. Selection of fencing type and height could impact the overall attractiveness of the facility. For example, lower wooden fencing may be provide on the Bay side of the pathway near wetlands to help prevent dogs from entering the wetlands, but preserving views.

Security: Fencing between the path and adjacent land uses can protect the privacy and security of the property owners. While crime or vandalism have not proven to be a common problem along most multi-use paths, fencing is still considered a prudent feature especially in some residential areas. The type, height, and maintenance responsibility of the fencing is dependent on local policies. New privacy fencing and landscaping may be required between the pathway and the residential/RV uses along the pathway.

An allowance for fencing is included in the cost estimates for this project. Potential types of fencing are shown on the following page.

CROSSINGS

Alignment 1C benefits from having a single, new, unprotected road crossing at the north end of Redwood Highway. This reduces the potential conflict between path users and motorists. An unprotected crossing consists of a crosswalk, signing, and often no other devices to slow or stop traffic (see Figure 23).

Road crossings from separated paths, as in alignment 1C, require two critical considerations: (1) path users will be enjoying an auto-free experience and may enter into an intersection unexpectedly, and (2) motorists will not expect to see bicycles or pedestrians shooting out from

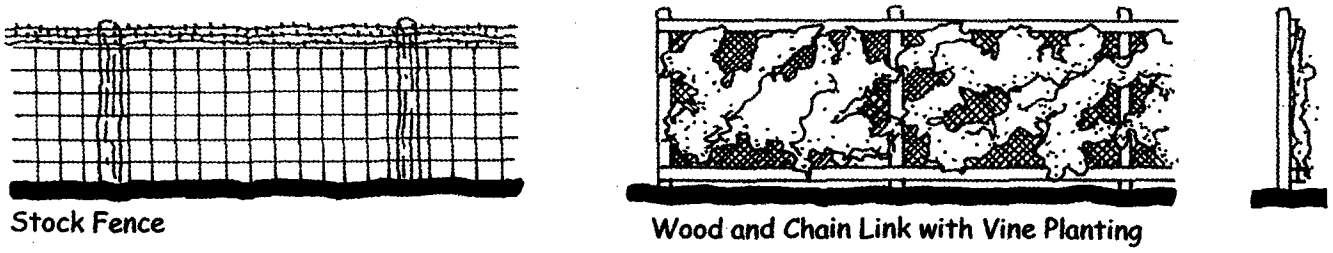


Figure 22 - Fence Types

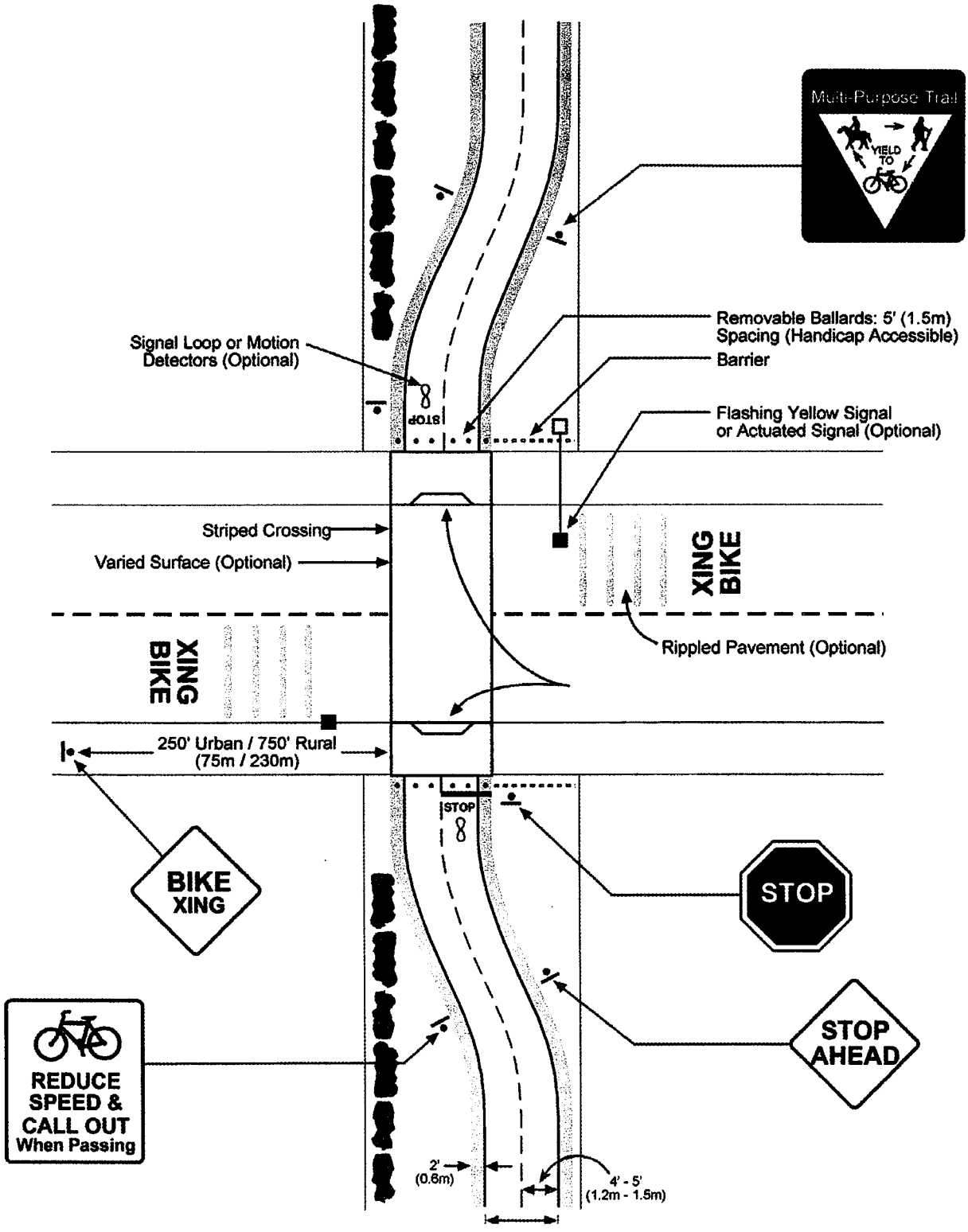


Figure 23 - Unprotected Road Crossing

an unmarked location into the roadway. In most cases, path crossings at-grade at can be properly designed to a reasonable degree of safety and to meet existing traffic and safety standards.

Standard Crossing Features

This section summarizes some of the key attributes of all path crossings.

Signing

Crossing features for all roadways include warning signs both for vehicles and path users. The type, location, and other criteria are identified in the *Manual for Uniform Traffic Control Devices* (MUTCD) and the Caltrans *Highway Design Manual.* Consideration must be given for adequate warning distance based on vehicle speeds and line of sight, with visibility of any signing absolutely critical. Catching the attention of motorists jaded to roadway signs may require additional alerting devices such as a flashing light, roadway striping, or changes in pavement texture. Signing for path users must include a standard "STOP" sign and pavement marking, sometimes combined with other features such as bollards to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their impact.

Directional signing may be useful for path users and motorists alike. For motorists, a sign reading "Path Xing" along with a path emblem or logo helps both warn and promote use of the path itself. For path users, directional signs and street names at crossings help direct people to their destinations. Care should be taken to keep vegetation and other obstacles out of the view line for motorists and path users.

Striping

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. The actual crosswalk striping is a matter of local and state preference, and may be accompanied by pavement treatments to help warn and slow motorists. The effectiveness of crosswalk striping is highly related to local customs and regulations. In communities where motorists do not typically defer to pedestrians in crosswalks, additional measures may be required.

GRADES

The preferred CMFC path alignment has been designed to a maximum gradient of 8.3% with appropriate landings to reflect Americans with Disabilities Act (ADA) recommendations. While both Caltrans "Chapter 1000 (Planning and Design of Bikeways)" and AASHTO's *Guide for the Development of Bicycle Facilities* states that grades up to 10% are allowable for shorter distances on bike paths, the application of ADA standards on multi-use paths is less clear. The State has started requiring that all multi-use paths meet ADA standards under the expectation that they will be used by both bicycles and pedestrians. Steeper grades, up to 8.3%, can be used with intermittent landings, although these are generally inappropriate for pathways with bicycle use because they can cause a bicyclist to lose control. The 8.3% grade has been recommended as a maximum for use only on individual ramps between path segments.

UTILITIES AND LIGHTING

Surface and sub-surface utilities may be located within the NWP right of way, impacting the location and construction of the CMFC path. Utilities can include active and abandoned railroad communication cables, signal and communication boxes, fiber optic cables, water and sewer lines, gas and petroleum lines, and telephone lines. The right-of-way path section will be designed to avoid having to move most active surface utilities. The path may be located directly over existing sub-surface utilities assuming (a) adequate depth exists between the path surface and utility to prevent damage, and (b) agreements can be reached with the utility owner regarding access for repairs and impact to the path.

For environmental purposes, the CMFC path is not proposed to have new lighting. The path section through the easement corridor and along Redwood Highway will receive lighting benefit from existing lights on that road and possibly from the Marin RV Park property. The City of Larkspur may choose to light portions of the path on the right-of-way, especially where there is considerable evening pedestrian and bicycle commuter traffic. Adjacent private property concerns will have to be considered when locating lights on the right-of-way section.

ENTRANCE FEATURES

The existing trailhead or parking area at the end of Industrial Way will also likely serve as a trailhead for the CMFC project. However, no specific improvements are included in the plans or cost estimates for this area. Depending on available resources and local support, the CMFC path may contain a variety of support facilities such as:

1. **Path entries**. The path will draw substantial numbers of users during peak times. Path users could be directed to specific path entries where parking and other amenities are provided, helping to relieve some of the pressure on residential and commercial areas. Path entries may also contain drinking fountains, telephones, restrooms, bike lockers, and other features. They should be accessible by transit service.

2. **Bollards.** A single 48-inch wood or metal bollard (post) should be placed on the centerline of the path at all entrances to prevent motor vehicles from entering the path. The bollard should be designed with high reflective surfaces and be brightly painted. The bollard should be locked to a ground plate and be easily removed by emergency vehicles. Collapsible bollards are another option.

3. **Entrance characteristics.** The path alignment should have a sharp (20' or less radius) curve at the Wornum Drive and Redwood Highway intersection to help slow bicycles. A new barrier will also be required at the bottom of the proposed ramp to ESFD from the existing trestle (1A) or new bridge (1B). Entrance signs should include regulations, hours of operation (if any), and path speed limit. Entrance signs may also include sponsorships by local agencies, organizations, and/or corporations. Signs may be placed at the entrances or at appropriate locations along the path that provide brief descriptions of historic events or natural features (see Figure 24).

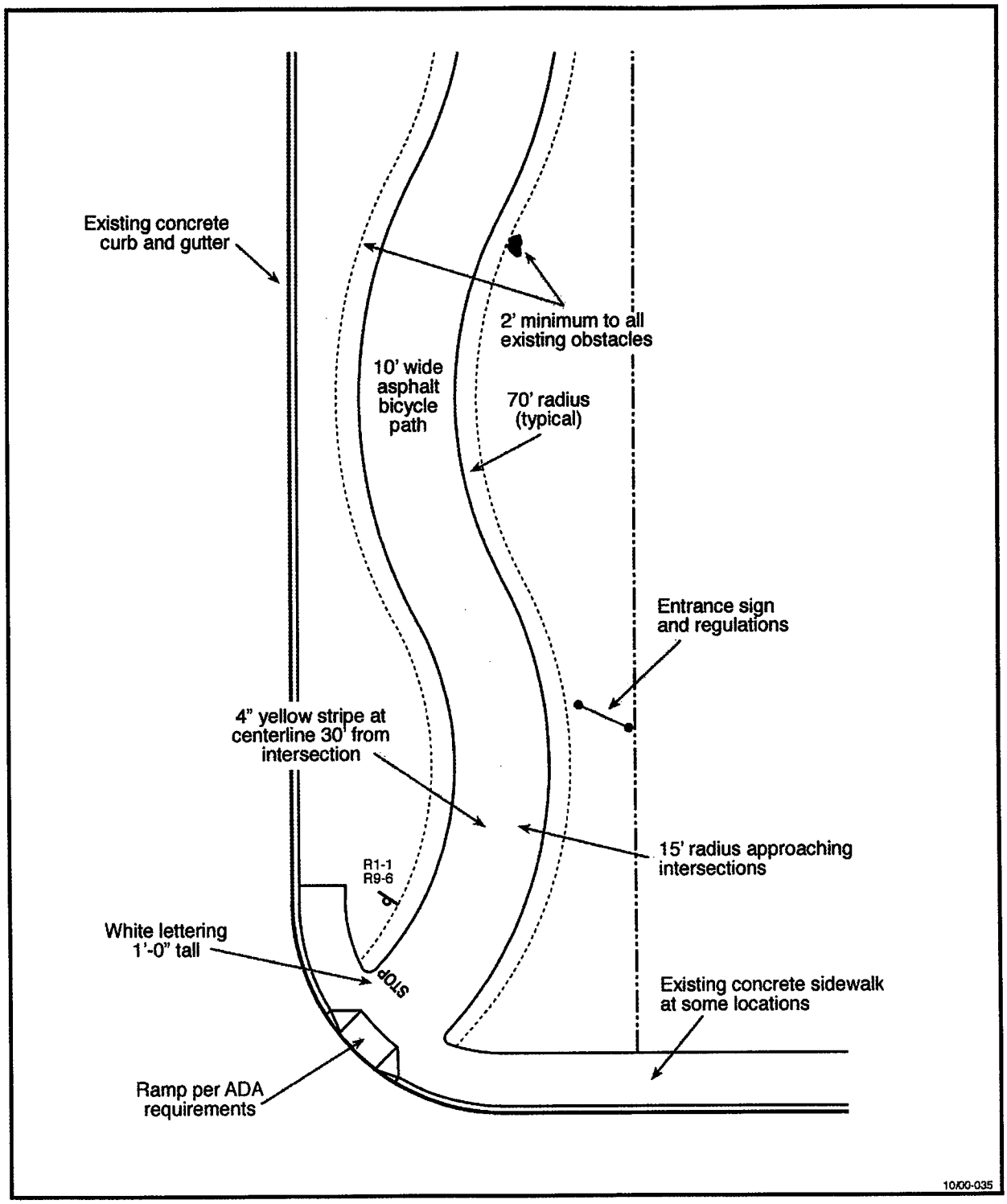


Figure 24 - Path Entry Characteristics

LANDSCAPING

Landscaping is not specifically planned along the CMFC path, except within the easement corridor of alignment 1C. The right-of way segments are intended to benefit from the existing natural vegetation, and native plants may be planted to replace items lost during construction, to help stabilize slopes, or to help protect the privacy of adjacent parcels. Plantings such as vines on fencing may be employed to provide privacy for adjacent property owners.

OPERATIONS AND MAINTENANCE

Operations and maintenance of the CMFC path is of utmost importance for the productive use of the facility, and the financial and liability resources of the City of Larkspur. Some portions of the CMFC path may represent new or unusual operations and maintenance costs or practices for the City. Some of these areas are identified below.

OPERATIONS

Operation activities on the CMFC path will consist primarily of monitoring and security. Monitoring accidents including identifying the primary cause and rectifying any physical deficiencies must be accomplished by the City. The local police department typically has the responsibility for collecting accident information identifying fault, while the City has the responsibility for identifying and improving physical or operational conditions that may have contributed to the accident. The City typically also has the responsibility for making the determination to warn path users of problems, and to close the path when conditions warrant.

SECURITY

Most multi-use paths in the United States do not have a dedicated police patrol of the facility. The City should provide routine police patrols on all of its multi-use paths, including the CMFC path. As a rule of thumb, a multi-use path such as the CMFC path with average usage or greater will require one man-hour per day for every five miles of path. This translates into less than one man-hour/day for either of the three one-mile long preferred CMFC path alignments. This figure would also vary by time of week and year. Off-peak weekdays may require only .2 man-hours/day, while peak weekends may require a full 1 man-hour/day.

A summary of key security recommendations is presented below.

1. Make all segments of the CMFC path that are located more than 100' from public roads accessible to emergency vehicles.
2. Illuminate all grade crossings.
3. Trim all vegetation at least 10 feet from the CMFC path where possible to maximize visibility.

4. Provide bicycle racks and lockers at key destinations that allow for both frame and wheels to be locked.

5. Provide fire and police departments with map of system, along with access points and keys/combinations to gates/bollards.

6. Enforce speed limits and other rules of the road.

MAINTENANCE

Maintenance of the CMFC path will include the following regular activities:

Item	Frequency
Sign replacement/repair	1-3 years
Pavement marking replacement	1-3 years
Tree, Shrub, & grass trimming/fertilization	5 months- 1 year
Pavement sealing/potholes	5-15 years/30-40 years for concrete
Clean drainage system	1 year
Pavement sweeping	Monthly - annually as needed
Shoulder and grass mowing	as needed
Trash disposal	as needed
Lighting replacement/repair	1 year
Graffiti removal	Weekly - monthly as needed
Maintain furniture	1 year
Fountain/restroom cleaning/repair	Weekly - monthly as needed
Pruning	1-4 years
Remove fallen trees	As needed
Weed control	Monthly - as needed
Maintain emergency telephones	1 year

Many of these maintenance items are dependent on the type and amount of supporting infrastructure that is developed along the path.

SAFETY

Safety is not considered a significant potential problem on the right-of-way alignments 1B and 1C, due to users' separation from traffic except at the Redwood Highway crossing. Alignment 2A, however, parallels Redwood Highway, and riding bicycles or walking on busy streets increases path users' exposure to potential injury due to the proximity to vehicles that can cause injuries or fatalities.

The fact that people already walk along the NWP right-of-way and nearby levies within the Corte Madera ecological reserve without tremendous investment in fencing, maintenance, and enforcement, would continue with or without the CMFC path. Providing a path along the NWP right-of-way, as in alignments 1B and 1C, will help to better organize and contain an activity that is already underway. The NWP right-of-way is, for the most part, unfenced and uncontrolled in

its current state. The CMFC path will improve safety conditions on this section of the NWP right-of-way by providing a designated place to walk, separating users from Redwood Highway traffic, and providing routine patrols.

Safety will be addressed on the CMFC path in the following manner:

1. Adhere to the established design, operation, and maintenance standards presented in this document.
2. Supplement these standards with the sound judgment of professional engineers.
3. Maintain adequate recording and response mechanisms for reported safety and maintenance problems.
4. Thoroughly research the causes of each reported accident on the CMFC path. Respond to accident investigations by appropriate design or operation improvements.
5. Design the path, its structures, and access points to be accessible by emergency vehicles. Bollards at the path entries should be removable by the appropriate fire, ambulance, and police agencies. Constrained segments of the path that cannot accommodate emergency vehicles should not be longer than 500 feet, and identified in advance by the appropriate police, fire, and ambulance services.
6. Provide regular police patrols to the extent needed.

PRIVATE PROPERTY PROTECTION

The CMFC path will be located directly adjacent to private properties along some of its proposed route in alignments 1B and 1C. Neighbor concerns regarding path location near their properties typically include a loss of visual privacy, and concerns about increased crime, vandalism, noise, and fire. Wherever possible, the path should be located as far away as possible to protect the privacy of adjacent property owners. Criminal activity is not likely to occur along a path that is well planned, designed, operated, maintained, and used. Fire concerns should be addressed in part by adequate weed abatement.

New privacy fencing is not required as part of the path project as most land owners have already taken measures to screen or separate their property from users of the right-of-way. However, fencing types, designs, and landscaping suggestions may be provided to property owners so that they can select the most appropriate barrier for their property. Property owners should be permitted to install gates leading directly onto the path, if desired.

PATH REPAIRS & CLOSURE

Path users will need to be managed during construction and periodic maintenance of the path, when sections of the path will be closed or unavailable to users. Path users must be warned of impending path closures, and given adequate detour information to bypass the closed or unfinished section of path. Path users must be warned through the use of standard signing at the

entrance to each affected section of path ("Path Closed"), including (but not limited to) information on alternate routes and dates of closure. Sections of the path that are closed must be gated or otherwise blockaded and clearly signed as closed to public use. Alternate routes should provide a reasonable level of directness and lower traffic volumes, and signed consistently. If no reasonable alternate routes are available, the path should have an "End Path" sign and provide access to the street and sidewalk system.

FUNDING

Funding for planning, design, and construction of the path will come from a variety of local, state, and federal funding. Most of these programs are competitive and involve the completion of extensive applications with clear documentation of the project need, costs, and benefits. Local funding for trail projects typically comes from local capital improvement programs (CIPs), which are typically used to leverage larger competitive grants.

The reauthorization of TEA-21 is a probable major source of funding for the CMFC project. This will be the third iteration of federal transportation legislation for pedestrian and bicycle project funding. This funding was established by Congress in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) and renewed in 1998 through the Transportation Equity Act for the 21st Century (TEA-21). TEA-21 expired on September 30, 2003, but has been extended until April 30, 2004.

Two major programs contained in TEA-21 and assumed to continue in the reauthorization are STP (Surface Transportation Program) and CMAQ (Congestion Management and Air Quality Improvements), along with other programs such as the Recreational Trails Program, Section 402 (Highway Safety) funds, National Scenic Byways funds, and Federal Lands Highway Program.

Funding from TEA-21 and its reauthorization will be administered through the state (California Transportation Commission) and regional governments (MTC). In the past, most, but not all, of the funding programs have been transportation oriented, not recreation oriented, with an emphasis on (a) reducing auto trips and (b) providing an inter-modal connection. Funding criteria typically includes completion and adoption of a bicycle master plan, quantification of the costs and benefits of the system (including saved vehicle trips, reduced air pollution), proof of public involvement and support, CEQA compliance, access to right of way, and commitment of local resources.

The following state sources provide funding applicable to bicycle or pedestrian facilities:

- **TDA Article III (SB 821):** Transportation Development Act (TDA) Article III funds are state block grants awarded annually to local jurisdictions for bicycle and pedestrian projects in California. These funds originate from the state sales tax and are distributed through the Congestion Management Agency to local jurisdictions based on population.

- **AB 434:** This was a bill passed in 1991 specifically for the San Francisco Bay Area by the Bay Area Air Quality Management District. Its funds are available for clean air

transportation projects in California. The funds are collected from a statewide $4 surcharge on motor vehicle registration fees. AB 434 designates 60 percent of the money generated for regional clean air funds, available on a competitive basis, for a variety of clean air projects, including bicycle and pedestrian projects.

- **Bicycle Transportation Account:** The State Bicycle Transportation Account (BTA) is an annual statewide discretionary program that is available through the Caltrans Bicycle Facilities Unit for funding bicycle projects. Available as grants to local jurisdictions, the emphasis is on projects that benefit bicycling for commuting purposes. The program is currently funded at $7.2 million dollars annually through fiscal year 2005/06. In 2006/07, it is anticipated to decline to $5 million dollars, where it will remain unless a law is passed to change the amount. Agencies may apply for these funds through the Caltrans Office of Bicycle Facilities.

A variety of local sources are available for funding bikeway and pedestrian improvements, however their use is often dependent on local political support and budgetary conditions. One source of funds for environmental review could be the $400,000 Caltrans and the County of Marin placed in escrow for the Central Marin Ferry Connection project from the HOV Gap Closure Project. The Association of Bay Area Governments (ABAG) will have planning and construction grants available for Bay Trail projects beginning in the summer of 2004. These funds should be pursued for Phase I construction. Another possible source of funds could come from the recently-passed Regional Measure 2 that included this project as a component. However, obtaining these funds may involve persistent efforts at the regional level.

LIABILITY

In general, liability risks for neighbors of multi-use paths is well protected and probably reduced from current levels by the recreational use statute and other statutes. Assuming the path is designed, built, and operated to established standards, there is no additional liability for the City of Larkspur.